ESP32 Series

Datasheet

Including:

ESP32-D0WD-V3

ESP32-D0WDQ6-V3

ESP32-D0WD

ESP32-D0WDQ6

ESP32-D2WD

ESP32-S0WD

ESP32-U4WDH



Version 3.5

Espressif Systems

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About This Guide

This document provides the specifications of ESP32 family of chips.

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1 Overview

ESP32 is a single 2.4 GHz Wi-Fi-and-Bluetooth combo chip designed with the TSMC ultra-low-power 40 nm technology. It is designed to achieve the best power and RF performance, showing robustness, versatility and reliability in a wide variety of applications and power scenarios.

The ESP32 series of chips includes ESP32-D0WD-V3, ESP32-D0WDQ6-V3, ESP32-D0WD, ESP32-D0WDQ6, ESP32-D2WD, ESP32-S0WD, and ESP32-U4WDH, among which, ESP32-D0WD-V3, ESP32-D0WDQ6-V3, and ESP32-U4WDH are based on ECO V3 wafer.

For details on part numbers and ordering information, please refer to Section 7.

For details on ECO V3 instructions, please refer to *CQN10 CAM T1 Sqcp Esjbc*.

1.1 Featured Solutions

1.1.1 Ultra-Low-Power Solution

ESP32 is designed for mobile, wearable electronics, and Internet-of-Things (IoT) applications. It features all the state-of-the-art characteristics of low-power chips, including fine-grained clock gating, multiple power modes, and dynamic power scaling. For instance, in a low-power IoT sensor hub application scenario, ESP32 is woken up periodically and only when a specified condition is detected. Low-duty cycle is used to minimize the amount of energy that the chip expends. The output of the power amplifier is also adjustable, thus contributing to an optimal trade-off between communication range, data rate and power consumption.

Note:
For more information, refer to Section 3.7 *PRA _lb Jmu+Nmucp K_l_eckclr*.

1.1.2 Complete Integration Solution

ESP32 is a highly-integrated solution for Wi-Fi-and-Bluetooth IoT applications, with around 20 external components. ESP32 integrates an antenna switch, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. As such, the entire solution occupies minimal Printed Circuit Board (PCB) area.

ESP32 uses CMOS for single-chip fully-integrated radio and baseband, while also integrating advanced calibration circuitries that allow the solution to remove external circuit imperfections or adjust to changes in external conditions. As such, the mass production of ESP32 solutions does not require expensive and specialized Wi-Fi testing equipment.

1.2 Wi-Fi Key Features

- 802.11 b/g/n
- 802.11 n (2.4 GHz), up to 150 Mbps
- WMM
- TX/RX A-MPDU, RX A-MSDU
- Immediate Block ACK

- Defragmentation
- Automatic Beacon monitoring (hardware TSF)
- 4 × virtual Wi-Fi interfaces
- Simultaneous support for Infrastructure Station, SoftAP, and Promiscuous modes
  Note that when ESP32 is in Station mode, performing a scan, the SoftAP channel will be changed.
- Antenna diversity

Note:
For more information, please refer to Section 3.5 $U_{\text{⇕}}$+$D_{\text{⇕}}$.

1.3 BT Key Features

- Compliant with Bluetooth v4.2 BR/EDR and BLE specifications
- Class-1, class-2 and class-3 transmitter without external power amplifier
- Enhanced Power Control
- +12 dBm transmitting power
- NZIF receiver with –94 dBm BLE sensitivity
- Adaptive Frequency Hopping (AFH)
- Standard HCI based on SDIO/SPI/UART
- High-speed UART HCI, up to 4 Mbps
- Bluetooth 4.2 BR/EDR BLE dual mode controller
- Synchronous Connection-Oriented/Extended (SCO/eSCO)
- CVSD and SBC for audio codec
- Bluetooth Piconet and Scatternet
- Multi-connections in Classic BT and BLE
- Simultaneous advertising and scanning

1.4 MCU and Advanced Features

1.4.1 CPU and Memory

- Xtensa® single-/dual-core 32-bit LX6 microprocessor(s), up to 600 MIPS (200 MIPS for ESP32-S0WD/ESP32-U4WDH, 400 MIPS for ESP32-D2WD)
- 448 KB ROM
- 520 KB SRAM
- 16 KB SRAM in RTC
- QSPI supports multiple flash/SRAM chips

1.4.2 Clocks and Timers

- Internal 8 MHz oscillator with calibration
- Internal RC oscillator with calibration
- External 2 MHz ~ 60 MHz crystal oscillator (40 MHz only for Wi-Fi/BT functionality)
- External 32 kHz crystal oscillator for RTC with calibration
- Two timer groups, including 2 × 64-bit timers and 1 × main watchdog in each group
- One RTC timer
- RTC watchdog

1.4.3 Advanced Peripheral Interfaces

- 34 × programmable GPIOs
- 12-bit SAR ADC up to 18 channels
- 2 × 8-bit DAC
- 10 × touch sensors
- 4 × SPI
- 2 × I²S
- 2 × I²C
- 3 × UART
- 1 host (SD/eMMC/SDIO)
- 1 slave (SDIO/SPI)
- Ethernet MAC interface with dedicated DMA and IEEE 1588 support
- Two-Wire Automotive Interface (TWAI®, compatible with ISO11898-1)
- IR (TX/RX)
- Motor PWM
- LED PWM up to 16 channels
- Hall sensor

1.4.4 Security

- Secure boot
- Flash encryption
- 1024-bit OTP, up to 768-bit for customers
- Cryptographic hardware acceleration:
  - AES
  - Hash (SHA-2)

  - RSA
  - ECC
  - Random Number Generator (RNG)

1.5 Applications (A Non-exhaustive List)

- Generic Low-power IoT Sensor Hub
- Generic Low-power IoT Data Loggers
- Cameras for Video Streaming
- Over-the-top (OTT) Devices
- Speech Recognition
- Image Recognition
- Mesh Network
- Home Automation
  - Light control
  - Smart plugs
  - Smart door locks
- Smart Building
  - Smart lighting
  - Energy monitoring
- Industrial Automation
  - Industrial wireless control
  - Industrial robotics
- Smart Agriculture
  - Smart greenhouses
  - Smart irrigation
  - Agriculture robotics
- Audio Applications
  - Internet music players
  - Live streaming devices
  - Internet radio players
  - Audio headsets
- Health Care Applications
  - Health monitoring
  - Baby monitors
- Wi-Fi-enabled Toys
  - Remote control toys
  - Proximity sensing toys
  - Educational toys
- Wearable Electronics
  - Smart watches
  - Smart bracelets
- Retail & Catering Applications
  - POS machines
  - Service robots

1.6 Block Diagram

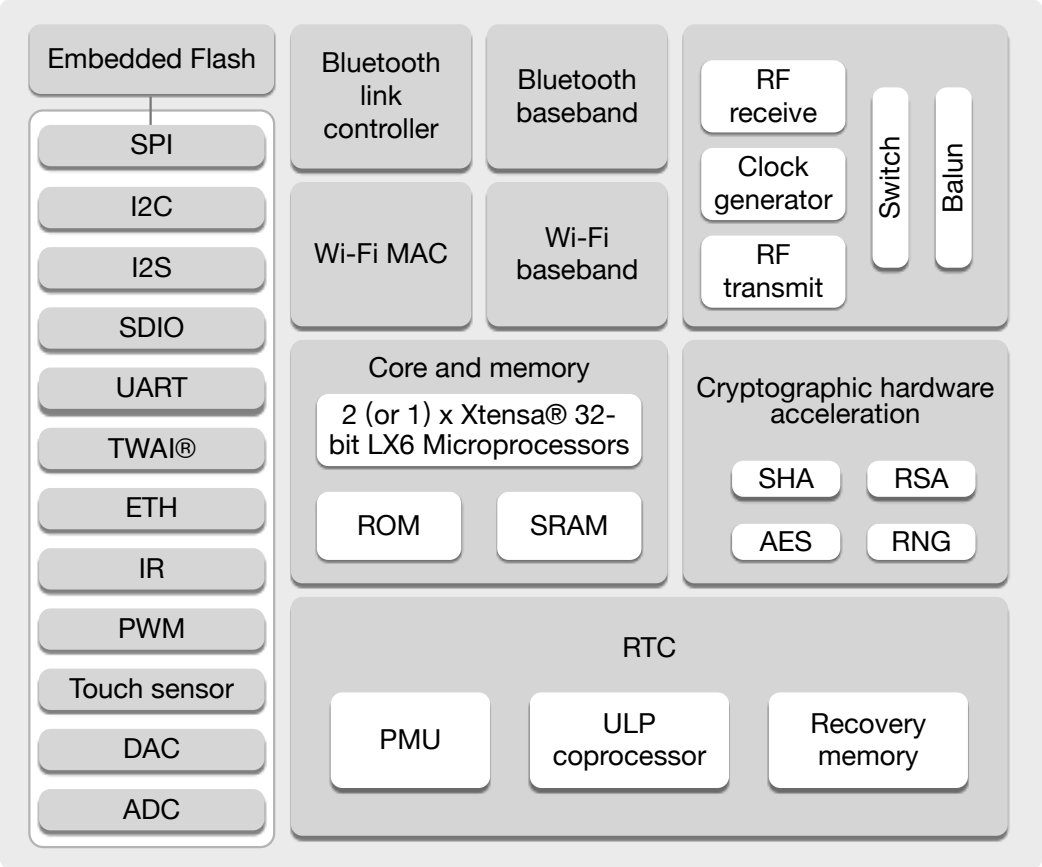


Figure 1: Functional Block Diagram

Note:
Products in the ESP32 series differ from each other in terms of their support for embedded flash and the number of CPUs they have. For details, please refer to Section 7 *N_pr Lsk `cp _lb Mpbcpgle ⟨ldmpk_rgml*.

2 Pin Definitions

2.1 Pin Layout

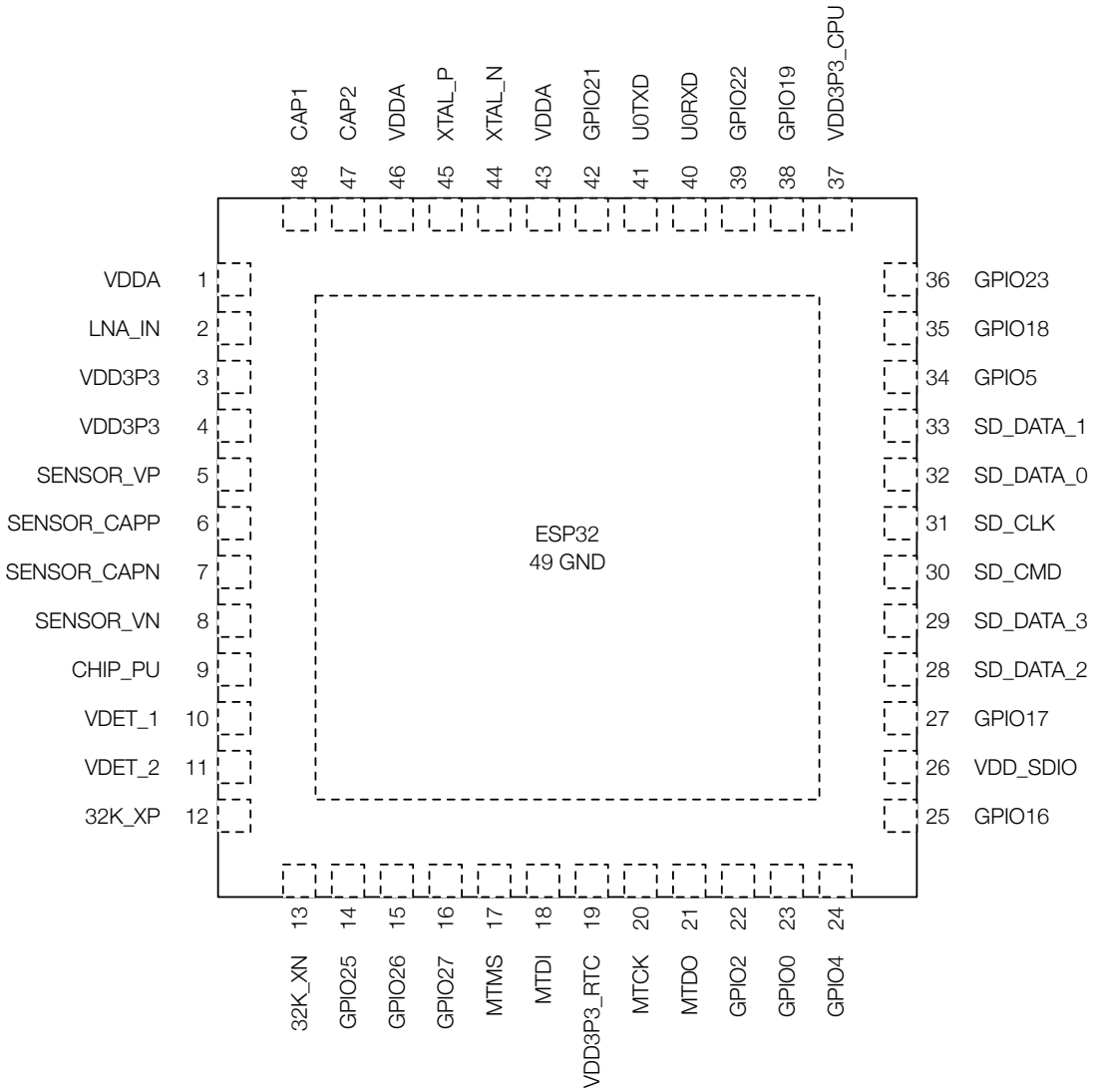


Figure 2: ESP32 Pin Layout (QFN 6*6, Top View)

'JHVSF &41 1JO-BZPVU 2'/ 5PQ7JFX

/PUF
'PS EFUBJMT PO &41 T QBSU OVNCFST BOE UIF DPSSFTQPOEJOH QJO
*OGPSNBUJPO

1JO %FTDSJQUJPO

5BCMF 1JO %FTDSJQUJPO

/BNF	/P	5ZQ	'VODl				
"OBMPH							
7%%"		1	"OBMPH QPXFS TVQQMZ 7				
-/"@*/		* 0	3' JOQVU BOE PVUQVU				
7%% 1		1	"OBMPH QPXFS TVQQMZ 7				
7%% 1		1	"OBMPH QPXFS TVQQMZ 7				
7%% 1 @35$							
4&/403@71		*	(1*0 "%$ @$) 35$@(1*0				
4&/403@$"11		*	(1*0 "%$ @$) 35$@(1*0				
4&/403@$"1/		*	(1*0 "%$ @$) 35$@(1*0				
4&/403@7/		*	(1*0 "%$ @$) 35$@(1*0				
$)*1@16		*	)JHI 0O FOBCMFT UIF DIJQ -PX 0GG UIF DIJQ QPXFST PGG /PUF %P OPU MFBWF UIF $)*1@16 QJO GMPBUJOH				
7%&5@		*	(1*0 "%$ @$) 35$@(1*0				
7%&5@		*	(1*0 "%$ @$) 35$@(1*0				
,@91		* 0	(1*0 "%$ @$) 35$@(1*0	506$)	,@91	L)[DSZTUBM PTDJMMBUPS JOQV	
,@9/		* 0	(1*0 "%$ @$) 35$@(1*0	506$)	,@9/	L)[DSZTUBM PTDJMMBUPS PVUQ	
(1*0		* 0	(1*0 "%$ @$) 35$@(1*0	%"$@	&."$@39%		
(1*0		* 0	(1*0 "%$ @$) 35$@(1*0	%"$@	&."$@39%		
(1*0		* 0	(1*0 "%$ @$) 35$@(1*0	506$)	&."$@39@%7		
.5.4		* 0	(1*0 "%$ @$) 35$@(1*0	506$)	&."$@59%	)41*$-,)4 @$-,	4%@$-,
.5%*		* 0	(1*0 "%$ @$) 35$@(1*0	506$)	&."$@59%	)41*2)4 @%"5"	4%@%"5"
7%% 1 @35$		1	*OQVU QPXFS TVQQMZ GPS35$*0 7				
.5$,		* 0	(1*0 "%$ @$) 35$@(1*0	506$)	&."$@39@&3	)41*%)4 @%"5"	4%@%"5'
.5%0		* 0	(1*0 "%$ @$) 35$@(1*0	506$)	&."$@39%	)41*$4)4 @$.%	4%@$.%

&TQSFTTJG 4ZTUFNT

4VCNJU %PDVNFOUBUJPO 'FFECBDL

&41 4FSJFT %BUBTIFFU W

1JO %FGJOJUJPOT

/BNF	/P	5ZQ	'VODUIPO
(1*0		* 0	(1*0 "%$ @$) 35$@(1*0 506$))41*81)4 @%"5" 4%@%"5"
(1*0		* 0	(1*0 "%$ @$) 35$@(1*0 506$) &."$@59@$-, $-,@065
(1*0		* 0	(1*0 "%$ @$) 35$@(1*0 506$) &."$@59@&3)41*)%)4 @%"5" 4%@%"5"
7%%@4%*0			
(1*0		* 0	(1*0)4 @%"5" 6 39%&."$@$-,@065
7%%@4%*0		1	0VUQVU QPXFS TVQQMZ 7 PS UIF TBNF WPMUBHF BT 7%% 1 @35$
(1*0		* 0	(1*0)4 @%"5" 6 59%&."$@$-,@065@
4%@%"5"@		* 0	(1*0)4 @%"5" 6 39%4%@%"5" 41*)%
4%@%"5"@		* 0	(1*0)4 @%"5" 6 59%4%@%"5" 41*81
4%@$.%		* 0	(1*0)4 @$.% 6 354 4%@$.% 41*$4
4%@$-,		* 0	(1*0)4 @$-, 6 $54 4%@$-, 41*$-,
4%@%"5"@		* 0	(1*0)4 @%"5" 6 3544%@%"5" 41*2
4%@%"5"@		* 0	(1*0)4 @%"5" 6 $544%@%"5" 41*%
7%% 1 @$16			
(1*0		* 0	(1*0)4 @%"5" 741*$4 &."$@39@$-,
(1*0		* 0	(1*0)4 @%"5" 741*$-,
(1*0		* 0	(1*0)4 @4530#& 741*%
7%% 1 @$16		1	*OQVU QPXFS TVQQMZ GPS7$16 *0 7
(1*0		* 0	(1*0 6 $54 741*2 &."$@59%
(1*0		* 0	(1*0 6 354 741*81 &."$@59%
6 39%		* 0	(1*0 6 39% $-,@065
6 59%		* 0	(1*0 6 59% $-,@065 &."$@39%
(1*0		* 0	(1*0 741*)% &."$@59@&/
"OBMPH			
7%%"		1	"OBMPH QPXFS TVQQMZ 7
95"-@/		0	&YUFSOBM DSZTUBM PVUQVU
95"-@1		*	&YUFSOBM DSZTUBM JOQVU
7%%"		1	"OBMPH QPXFS TVQQMZ 7
$"1		*	$POOFDUT UP B O' DBQBCJMJUJFT PG $"1 QIBSBNMFM UP $"1

/BNF	/P	5ZQ	'VODl
$"1		*	$POOFDUT UP B O' TFSJFT DBQBDJUPS UP HSPVOE
(/%		1	(SPVOE

```
/PUF
   t 5IF QJO QJO NBQQJOH CFUXFFO &41 % 8% &41 6 8%) BOE UIF FNCFEEFE GMBTI JT BT GPMMPXT (1*0 $4 (1*0
     $-, 4%@%"5"@ *0 81 4%@%"5"@ *0 %* 5IF QJOT VTFE GPS FNCFEEFE GMBTI BSF OPU SFDPNNFOEFE GPS PUI
   t *O NPTU DBTFT UIF EBUB QPSU DPOOFDUJPO CFUXFFO &41 TFSJFT PG DIJQT PUIFS UIBO &41 % 8% &41 6 8%) B
     4%@%"5" 41*% *0 %* 4%@%"5" 41*)% *0 )0-% 4%@%"5" 41*81 *0 81
   t 'PS B RVJDL SFGFSFODF HVJEF UP VTJOH UIF *0@.69 &UIFSOFU."$ BOE (*41 BUSJY-QTOT PG &41 QMFBTF SFGFS
```

&TQSFTTJG 4ZTUFNT

1JO %FGJOJUJPOT

4VCNJU %PDVNFOUBUJPO 'FFECBDL

&41 4FSJFT %BUBTIFFU W

1PXFS 4DIFNF

&41 T EJHJUBM QJOT BSF EJWJEFE JOUP UISFF EJGGFSFOU QPXFS EPNBJO

- t 7%% 1 @35$
- t 7%% 1 @$16
- t 7%%@4%*0

7%% 1 @35$ JT BMTP UIF JOQVU QPXFS TVQQMZ GPS 35$ BOE $16

7%% 1 @$16 JT BMTP UIF JOQVU QPXFS TVQQMZ GPS $16

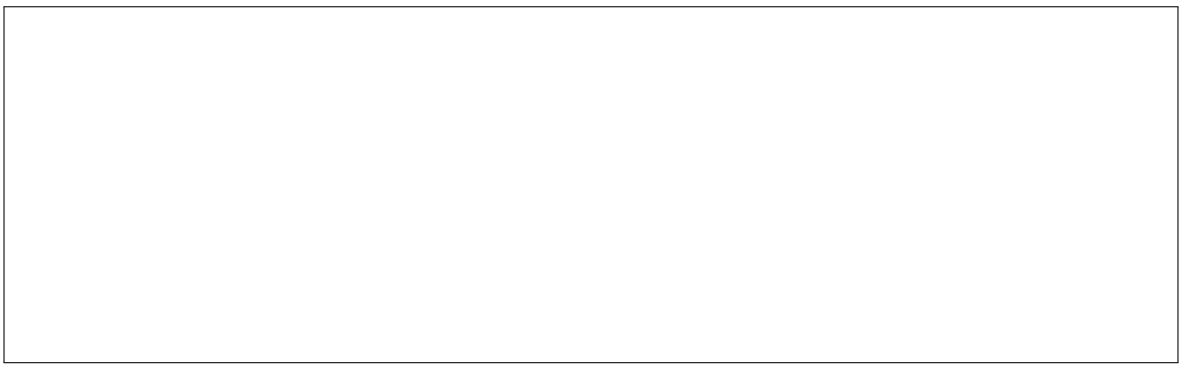
7%%@4%*0 DPOOFDUT UP UIF PVUQVU PG BO JOUFSOBM -%0 XIPTF JOQVU JT DPOOFDUFE UP UIF TBNF 1$# OFU UPHFUIFS XJUI 7%% 1 @35$ UIF JOUFSOB QPXFS TDIFNF EJBHSBN JT TIPXO CFMPX

'JHVSF &41 1PXFS 4DIFNF

5IF JOUFSOBM -%0 DBO CF DPOGJHVSFE BT IBWJOH 7 PS UIF TBNF WPMUB WJB TPGUXBSF UP NJOJNJ[F UIF DVSSFOU PG GMBTI 43". EVSJOH UIF %FFQ

/PUFT PO $)*1@16

- t 5IF JMMVTUSBUJPO CFMPX TIPXT UIF &41 QPXFS VQ BOE SFTFU UJNJOH JO 5BCMF



'JHVSF &41 1PXFS VQ BOE 3FTFU 5JNJOH

5BCMF %FTDSJQUJPO PG &41 1PXFS VQ BOE 3FTFU 5JNJOH 1B

1BSBNFU	%FTDSJQUJPO	.JO	6OJU
U	5JNF CFUXFFO UIF 7 SBJMT CFJOH CSPVHIU VQ BOE $)*1@16 BDUJWBUFE		T
U	%VSBUJPO PG $)*1@16 TJHOBM 7 MFWFM JT WBMVF JO 5BCMF %$ $IBSBDUFSJTUJDT UP SFTFU UIF DIJQ		T

t *O TDFOBSJPT XIFSF &41 JT QPXFSFE PO BOE PGG SFQFBUFEMZ CZ TXJ MBSHF DBQBDJUPS PO UIF 7%% SBJM BOE $)*1@16 BOE 7%% BSF DPOC $)*1@16 QPXFS SBJM BOE JNNFEJBUFMZ TXJUDIJOH JU CBDL PO NBZ DBV BOE GBJMVSF UP SFTFU UIF DIJQ BEFRVBUFMZ
"O BEEJUJPOBM EJTDIBSHF DJSDVJU NBZ CF SFRVJSFE UP BDDFMFSBUF 7%% XIJDI XJMM FOTVSF QSPQFS QPXFS PO SFTFU XIFO UIF &41 JT Q EJTDIBSHF DJSDVJU JS 8300. 1FSJQIFSBM 4DIFNBUJDT %BUBTIFFU

t 8IFO B CBUUFSZ JT VTFE BT UIF QPXFS TVQQMZ GPS UIF &41 TFSJFT PG TVQFSWJTPS JT SFDPNNFOEFE TP UIBU B CPPU GBJMVSF EVF UP MPX WP UP QVMM $)*1@16 MPX JG UIF QPXFS TVQQMZ GPS &41 JT CFMPX 7 'P 'JHVSF &41 8300. 1FSJQIFSBM 4DIFNBUJDT %BUBTIFFU

/PUFT PO QPXFS TVQQMZ

t 5IF PQFSBUJOH WPMUBHF PG &41 SBOHFT GSPN 7 UP 7 8IFO VTJO SFDPNNFOEFE WPMUBHF PG UIF QPXFS TVQQMZ JT 7 BOE JUT SFDPNN NPSF

t 8IFO 7%%@4%*0 7 JT VTFE BT UIF QPXFS TVQQMZ GPS FYUFSOBM GMB SFTJTUPS TIPVME CF BEEFE UP 7%%@4%*0 'PS UIF &41 DSZTUBM 4DIFNBUJDT %BUBTIFFU

t 8IFO UIF UISFF EJHJUBM QPXFS TVQQMJFT BSF VTFE UP ESJWF QFSJQIFS XJUI UIF QFSJQIFSBMT TQFDJGJDBUJPOT

4UBSUJOH 1JOT

5IFSF BSF GJWF TUBSUJOH QJOT

t .5%*

t (1*0

t (1*0

t .5%0

t (1*0

4PGUXBSF DBO SFBE UIF WBMVFT PG UIFTF GJWF CJUT GSPN SFHJTUFS w(1*

%VSJOH UIF DIJQ T TZTUFN SFTFU SFMFBTF QPXFS PO SFTFU 35$ XBUDIEF UIF TUSBQQJOH QJOT TBNQMF UIF WPMUBHF MFWFM BT TUSBQQJOH CJUT PG QPXFSFE EPXO PS TIVU EPXO 5IF TUSBQQJOH CJUT DPOGJHVSF UIF EFWJDI 7%%@4%*0 BOE PUIFS JOJUJBM TZTUFN TFUUJOHT

&BDI TUSBQQJOH QJO JT DPOOFDUFE UP JUT JOUFSOBM QVMM VQ QVMM EP TUSBQQJOH QJO JT VODPOOFDUFE PS UIF DPOOFDUFE FYUFSOBM DJSDVJU QVMM VQ QVMM EPXO XJMM EFUFSNJOF UIF EFGBVMU JOQVU MFWFM PG UIF

5P DIBOHF UIF TUSBQQJOH CJU WBMVFT VTFST DBO BQQMZ UIF FYUFSOBM .$6 T(1*0T UP DPOUSPM UIF WPMUBHF MFWFM PG UIFTF QJOT XIFO QPXFSJO

"GUFS SFTFU SFMFBTF UIF TUSBQQJOH QJOT XPSL BT OPSNBM GVODUJPO

3FGFS UP GPS EFUBJMFE CPPU NPEF DPOGJHVSBUJPO CZ TUSBQQJOH QJO

5BCMF 4USBQQJOH 1JOT

7PMUBHF PG *OUFSOBM -%0 7%%@4%*0			
1JO	%FGB	7	7
.5%*	1VMM	EPXO	
#PPUJOH .PEF			
1JO	%FGB	41* #PPU	%PXOMPBE #PPU
(1*0	1VMM	VQ	
(1*0	1VMM	EPXO %PO U DBSF	
&OBCMJOH %JTBCMJOH %FCVHHJOH -PH 1SJOU PWFS 6 59% %			
1JO	%FGB	6 59% "DUJWF	6 59% 4JMFOU
.5%0	1VMM	VQ	
5JNJOH PG 4%*0 4MBWF			
1JO	%FGB	'& 4BNQ '& 0VUQ	'& 4BNQ 3& 0VUQ	3& 4BNQ '& 0VUQ	3& 4BNQMJOH 3& 0VUQVU
.5%0	1VMM	VQ			
(1*0	1VMM	VQ			

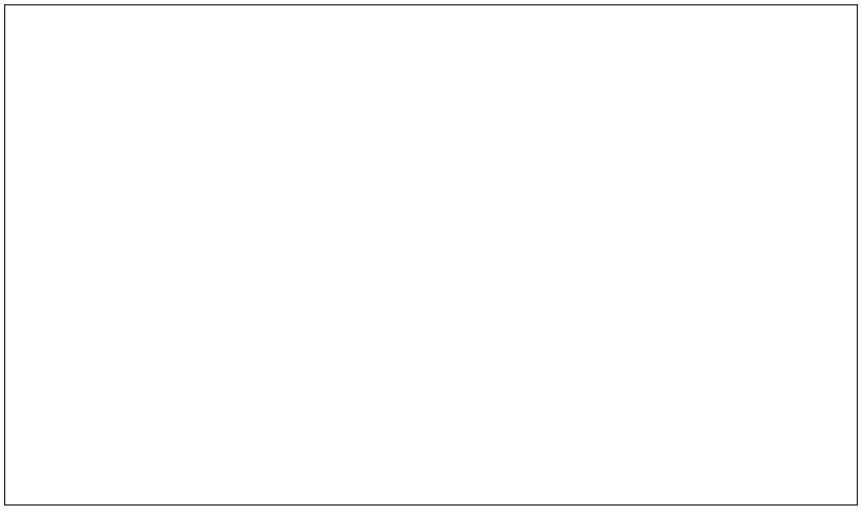
/PUF

t '& GBMMJOH FEHF 3& SJTJOH FEHF

t 'JSNXBSF DBO DPOGJHVSF SFHJTUFS CJUT UP DIBOHF UIF TFUUJOHT PG i7PMU PG 4%*0 4MBWFw BGUFS CPPUJOH

t 'PS &41 DIJQT UIBU DPOUBJO BO FNCFEEFE GMBTI VTFST OFFE UP OPUF UIF M % 8% DPOUBJOT BO FNCFEEFE GMBTI UIBU PQFSBUFT BU 7 UIFSFGPSF UIF 6 8%) DPOUBJOT BO FNCFEEFE GMBTI UIBU PQFSBUFT BU 7 UIFSFGPSF UIF

5IF JMMVTUSBUJPO CFMPX TIPXT UIF TFUVQ BOE IPME UJNFT GPS UIF TUSBQQJOH 1JO HPFT IJHI %FUBJMT BCPVU UIF QBSBNFUFST BSF MJTUFE JO 5BCMF



'JHVSF 4FUVQ BOE)PME 5JNFT GPS UIF 4USBQQJOH 1JO

5BCMF 1BSBNFUFS %FTDSJQUJPOT PG 4FUVQ BOE)PME 5JNFT GP

1BSBNFU	%FTDSJQUJPO	.JO	6OJU
U	4FUVQ UJNF CFGPSF $)*1@16 HPFT GSPN	MPX UP	NT
U	)PME UJNF BGUFS $)*1@16 HPFT IJHI		NT

'VODUJPOBM %FTDSJQUJPO

5IJT DIBQUFS EFTDSJCFT UIF GVODUJPOT JOUFHSBUFE JO &41

$16 BOE .FNPSZ

$16

&41 DPOUBJOT POF PS UXP MPX QJO 8*0 QFSJQIFSBM GVODUJPOT XJUI UIF GPMMI

- TUBHF QJQFMJOF UP TVQQPSU UIF DMPDL GSFRVFODZ PG VQ UP .)[&41 % 8% BOE &41 6 8%)
- CJU *OTUSVDUJPO 4FU QSPWJEFT IJHI DPEF EFOTJUZ
- 4VQQPSU GPS 'MPBUJOH 1PJOU 6OJU
- 4VQQPSU GPS %41 JOTUSVDUJPOT TVDI BT B CJU NVMUJQMJFS B C
- 4VQQPSU GPS JOUFSSVQU WFDUPST GSPN BCPVU JOUFSSVQU TPVSD

5IF TJOHMF EVBM $16 JOUFSGBDFT JODMVEF

- 9UFOTB 3". 30. *OUFSGBDF GPS JOTUSVDUJPOT BOE EBUB
- 9UFOTB -PDBM .FNPSZ *OUFSGBDF GPS GBTU QFSJQIFSBM SFHJTUFS BD
- &YUFSOBM BOE JOUFSOBM JOUFSSVQU TPVSDFT
- +5"(GPS EFCVHHJOH

*OUFSOBM .FNPSZ

&41 T JOUFSOBM NFNPSZ JODMVEFT

- ,# PG 30. GPS CPPUJOH BOE DPSF GVODUJPOT
- ,# PG PO DIJQ 43". GPS EBUB BOE JOTUSVDUJPOT
- ,# PG 43". JO 35$ XIJDI JT DBMMFE 35$ '"45 .FNPSZ BOE DBO CF VTFE GP CZ UIF NBJO $16 EVSJOH 35$ #PPU GSPN UIF %FFQ TMFFQ NPEF
- ,# PG 43". JO 35$ XIJDI JT DBMMFE 35$ 4-08 .FNPSZ BOE DBO CF BDDFTT EVSJOH UIF %FFQ TMFFQ NPEF
- ,CJU PG F'VTF CJUT BSF VTFE GPS UIF TZTUFN ."$ BEESFTT BOE DIJ CJUT BSF SFTFSWFE GPS DVTUPNFS BQQMJDBUJPOT JODMVEJOH GM
- &NCFEEFE GMBTI

/PUF
1SPEVDUT JO UIF &41 TFSJFT EJGGFS GSPN FBDI PUIFS JO UFSNT PG UIFJS TVQQ
EFUBJMT QMFBTF SFGFS UP UIF QSPEVDU TQFDJGJD 0SEFSJOH *OGPSNBUJPO

&YUFSOBM 'MBTI BOE 43".

&41 TVQQPSUT NVMUJQMF FYUFSOBM 241* GMBTI BOE 43". DIJQT .PSF EFU
&41 5FDIOJDBM 3FGFSFODF &41 BMTP TVQQPSUT IBSEXBSF FODSZQUJPO EFDSZ
QSPUFDU EFWFMPQFST QSPHSBNT BOE EBUB JO GMBTI

&41 DBO BDDFTT UIF FYUFSOBM 241* GMBTI BOE 43". UISPVHI IJHI TQFFE D

- 6Q UP .# PG FYUFSOBM GMBTI DBO CF NBQQFE JOUP $16 JOTUSVDUJPO
  TQBDF TJNVMUBOFPVTMZ
  - 8IFO FYUFSOBM GMBTI JT NBQQFE JOUP $16 JOTUSVDUJPO NFNPSZ T
    NBQQFE BU B UJNF /PUF UIBU JG NPSF UIBO .# ,# BSF NBQQFE D
    SFEVDFE EVF UP TQFDVMBUJWF SFBET CZ UIF $16
  - 8IFO FYUFSOBM GMBTI JT NBQQFE JOUP SFBE POMZ EBUB NFNPSZ TQ
    UJNF CJU CJU BOE CJU SFBET BSF TVQQPSUFE
- &YUFSOBM 43". DBO CF NBQQFE JOUP $16 EBUB NFNPSZ TQBDF 43". VQ U
  .# DBO CF NBQQFE BU B UJNF CJU CJU BOE CJU SFBET BOE XSJUF

/PUF
"GUFS &41 JT JOJUJBMJ[FE GJSNXBSF DBO DVTUPNJ[F UIF NBQQJOH PG FYUFSOE

.FNPSZ .BQ

5IF TUSVDUVSF PG BEESFTT NBQQJOH JO FYUFSOBM NBQQJOH PG
JO 5BCMF

'JHVSF "EESFTT .BQQJOH 4USVDUVSF

5BCMF .FNPSZ BOE 1FSJQIFSBM .BQQJOH

$BUFHPSZ	5BSHFU	4UBSU "EE	&OE "EESF	4J[F
&NCFEEFE .FNPSZ	*OUFSOBM 30.	Y @	Y @''''	,#
	*OUFSOBM 30.	Y '' @	Y '' @''''	,#
	*OUFSOBM 43".	Y @	Y @''''	,#
	*OUFSOBM 43".	Y ''& @	Y '''@''''	,#
		Y " @	Y #@''''	
	*OUFSOBM 43".	Y '"@&	Y ''%@''''	,#
	35$ '"45 .FNPSZ	Y '' @	Y '' @ '''	,#
		Y $@	Y $@ '''	
	35$ 4-08 .FNPSZ	Y @	Y @ '''	,#
&YUFSOBM .FNPSZ	&YUFSOBM 'MBTI	Y ' @	Y ' '@''''	.#
		Y $@	Y #'@''''	.# ,#
	&YUFSOBM 3".	Y ' @	Y '#'@''''	.#
1FSJQIFSBM	%1PSU 3FHJTUFS	Y'' @	Y '' @ '''	,#
	"&4 "DDFMFSBUPS	Y'' @	Y '' @ '''	,#
	34" "DDFMFSBUPS	Y'' @	Y '' @ '''	,#
	4)" "DDFMFSBUPS	Y'' @	Y '' @ '''	,#
	4FDVSF #PPU	Y '' @	Y '' @ '''	,#
	$BDIF ..6 5BCMFT	Y '' @	Y '' @ '''	,#
	1*% $PVOUSPMMFS	Y'' @'	Y '' @''''	,#
	6"35	Y '' @	Y '' @ '''	,#
	41*	Y '' @	Y '' @ '''	,#
	41*	Y '' @	Y '' @ '''	,#
	(1*0	Y '' @	Y '' @ '''	,#
	35$	Y '' @	Y '' @ '''	,#
	*0 .69	Y '' @	Y '' @ '''	,#
	4%*0 4MBWF	Y '' @#	Y '' @#'''	,#
	6%."	Y '' @$	Y '' @$'''	,#
	B*M4	Y '' @'	Y '' @''''	,#
	6"35	Y '' @	Y '' @ '''	,#
	* $	Y '' @	Y '' @ '''	,#
	6%."	Y '' @	Y '' @ '''	,#
	4%*0 4MBWF	Y '' @	Y '' @ '''	,#
	3.5	Y '' @	Y '' @ '''	,#
	1$/5	Y '' @	Y '' @ '''	,#
	4%*0 4MBWF	Y '' @	Y '' @ '''	,#
	-&% 18.	Y '' @	Y '' @ '''	,#
	F'VTF $PVSPMMFS	Y'' @"	Y '' @"'''	,#
	'MBTI &ODSZQUJPO	Y'' @#	Y '' @#'''	,#
	18.	Y '' @&	Y '' @&'''	,#
	5*.(	Y '' @'	Y '' @''''	,#
	5*.(	Y '' @	Y '' @ '''	,#
	41*	Y '' @	Y '' @ '''	,#
	41*	Y '' @	Y '' @ '''	,#

$BUFHPSJFT	5BSHFU	4UBSU "EE	&OE "EESF	4J[F
1FSJQIFSBMT	4:4$0/	Y '' @	Y '' @ '''	,#
	* $	Y '' @	Y '' @ '''	,#
	4%..$	Y '' @	Y '' @ '''	,#
	&."$	Y '' @	Y '' @"'''	,#
	18.	Y '' @$	Y '' @$'''	,#
	* 4	Y '' @%	Y '' @%'''	,#
	6"35	Y '' @&	Y '' @&'''	,#
	18.	Y '' @'	Y '' @''''	,#
	18.	Y '' @	Y '' @ '''	,#
	3/(	Y '' @	Y '' @ '''	,#

5JNFST BOE 8BUDIEPHT

CJU 5JNFST

5IFSF BSF GPVS HFOFSBM QVSQPTF UJNFST FNCFEEFE JO UIF DIJQ 5IFZ BS
PO CJU QSFTDBMFST BOE CJU BVUP SFMPBE DBQBCMF VQ EPXO UJNFS

5IF UJNFST GFBUVSF

- t " CJU DMPDL QSFTDBMFS GSPN UP
- t " CJU UJNFS
- t $POGJHVSBCMF VQ EPXO UJNFS JODSFNFOUJOH PS EFDSFNFOUJOH
- t)BMU BOE SFTVNF PG UJNF CBTF DPVOUFS
- t "VUP SFMPBE BU BMBSNJOH
- t 4PGUXBSF DPOUSPMMFE JOTUBOU SFMPBE
- t -FWFM BOE FEHF JOUFSSVQU HFOFSBUJPO

8BUDIEPH 5JNFST

5IF DIJQ IBT UISFF XBUDIEPH UJNFST POF JO FBDI PG UIF UXP UJNFS NPEVM
.8%5 BOE POF JO UIF 35$ NPEVMF DBMMFE UIF 35$ 8BUDIEPH 5JNFS PS 38%
JOUFOEFE UP SFDPWFS GSPN BO VOGPSFTFFO GBVMU DBVTJOH UIF BQQMJD
XBUDIEPH UJNFS IBT GPVS TUBHFT &BDI TUBHF NBZ USJHHFS POF PG UISFF
JUT QSPHSBNNFE UJNF QFSJPE VOMFTT UIF XBUDIEPH JT GFE PS EJTBCMFE
SFTFU BOE TZTUFN SFTFU 0OMZ UIF 38%5 DBO USJHHFS UIF TZTUFN SFTFU
JODMVEJOH UIF 35$ JUTFMG " UJNFPVU WBMVF DBO CF TFU GPS FBDI TUBHF

%VSJOH GMBTI CPPU UIF 38%5 BOE UIF GJSTU .8%5 TUBSU BVUPNBUJDBMMZ
QSPCMFNT

5IF XBUDIEPHT IBWF UIF GPMMPXJOH GFBUVSFT

- t 'PVS TUBHFT FBDI PG XIJDI DBO CF DPOGJHVSFE PS EJTBCMFE TFQBSBU
- t " QSPHSBNNBCMF UJNF QFSJPE GPS FBDI TUBHF

- t 0OF PG UISFF PS GPVS QPTTJCMF BDUJPOT JOUFSSVQU $16 SFTFU DPS FBDI TUBHF
- t CJU FYQJSZ DPVOUFS
- t 8SJUF QSPUFDUJPO UIBU QSFWFOUT UIF 38%5 BOE .8%5 DPOGJHVSBUJP
- t 41* GMBTI CPPU QSPUFDUJPO
  G UIF CPPU QSPDFTT GSPN BO 41 GMBTI EPFT OPU DPNQMFUF XJUIJO B XJMM SFCPPU UIF FOUJSF TZTUFN

4ZTUFN $MPDLT

$16 $MPDL

6QPO SFTFU BO FYUFSOBM DSZTUBM DMPDL TPVSDF JT TFMFDUFE BT UIF E TPVSDF BMTP DPOOFDUT UP B 1-- UP HFOFSBUF B IJHI GSFRVFODZ DMPDL U

*O BEEJUJPO &41 IBT BO JOUFSOBM .)[PTDJMMBUPS 5IF BQQMJDBUJPO DSZTUBM DMPDL TPVSDF UIF 1-- DMPDL PS UIF JOUFSOBM .)[PTDJMMBUPS DMPDL EJSFDUMZ PS BGUFS EJWJTJPO EFQFOEJOH PO UIF BQQMJDBUJPO

35$ $MPDL

5IF 35$ DMPDL IBT GJWF QPTTJCMF TPVSDFT

- t FYUFSOBM MPX TQFFE L)[DSZTUBM DMPDL
- t FYUFSOBM DSZTUBM DMPDL EJWJEFE CZ
- t JOUFSOBM 3$ PTDJMMBUPS UZQJDBMMZ BCPVU L)[BOE BEKVTUBCM
- t JOUFSOBM .)[PTDJMMBUPS
- t JOUFSOBM L)[DMPDL EFSJWFE GSPN UIF JOUFSOBM .)[PTDJMMBU

8IFO UIF DIJQ JT JO UIF OPSNBM QPXFS NPEF BOE OFFET GBTUFS $16 BDDFT FYUFSOBM IJHI TQFFE DSZTUBM DMPDL EJWJEFE CZ PS UIF JOUFSOBM .)[MPX QPXFS NPEF UIF BQQMJDBUJPO DIPPTFT UIF FYUFSOBM MPX TQFFE UIF JOUFSOBM L)[DMPDL

"VEJP 1-- $MPDL

5IF BVEJP DMPDL JT HFOFSBUFE CZ UIF VMUSB MPX OPJTF GSBDUJPOBM / 1 BOE $MPDL &41 UIF 5FDIOJDBM 3FGFSFODF .BOVBM

3BEJP

5IF SBEJP NPEVMF DPOTJTUT PG UIF GPMMPXJOH CMPDLT

- t ()[SFDFJWFS
- t ()[USBOTNJUUFS
- t CJBT BOE SFHVMBUPST

- t CBMVO BOE USBOTNJU SFDFJWF TXJUDI
- t DMPDL HFOFSBUPS

()[3FDFJWFS

5IF ()[SFDFJWFS EFNPEVMBUFT UIF ()[3' TJHOBM UP RVBESBUVSF CBT UIF EJHJUBM EPNBJO XJUI UXP IJHI SFTPMVUJPO IJHI TQFFE "%$T 5P BEB GJMUFST "VUPNBUJD (BJO $POUSPM "($ %$ PGGTFU DBODFMBUJPO DJSD DIJQ

()[5SBOTNJUUFS

5IF ()[USBOTNJUUFS NPEVMBUFT UIF RVBESBUVSF CBTFCBOE TJHOBMT U BOUFOOB XJUI B IJHI QPXFSFE $PNQMFNFOUBSZ .FUBM 0YJEF 4FNJDPOEVD EJHJUBM DBMJCSBUJPO GVSUIFS JNQSPWFT UIF MJOFBSJUZ PG UIF QPXFS E EFMJWFSJOH VQ UP E#N PG QPXFS GPS BO C USBOTNJTTJPO BOE USBOTNJTTJPO

"EEJUJPOBM DBMJCSBUJPOT BSF JOUFHSBUFE UP DBODFM BOZ SBEJP JNQF

- t $BSSJFS MFBLBHF
- t * 2 QIBTF NBUDIJOH
- t #BTFCBOE OPOMJOFBSJUJFT
- t 3' OPOMJOFBSJUJFT
- t "OUFOOB NBUDIJOH

5IFTF CVJMU JO DBMJCSBUJPO SPVUJOFT SFEVDF UIF BNPVOU PG UJNF SFR FRVJQNFOU VOOFDFTTBSZ

$MPDL (FOFSBUPS

5IF DMPDL HFOFSBUPS QSPEVDFT RVBESBUVSF DMPDL TJHOBMT PG ()[G DPNQPOFOUT PG UIF DMPDL HFOFSBUPS BSF JOUFHSBUFE JOUP UIF DIJQ J SFHVMBUPST BOE EJWJEFST

5IF DMPDL HFOFSBUPS IBT CVJMU JO DBMJCSBUJPO BOE TFMG UFTU DJSDV PQUJNJ[FE PO DIJQ XJUI QBUFOUFE DBMJCSBUJPO BMHPSJUINT XIJDI FOTV UIF USBOTNJUUFS

8J 'J

&41 JNQMFNFOUT B 5$1 *1 BOE GVMM C H O 8J 'J ."$ QSPUPDPM *U TV 45" BOE 4PGU"1 PQFSBUJPOT VOEFS UIF %JTUSJCVUFE $POUSPM 'VODUJPO NJOJNBM IPTU JOUFSBDUJPO UP NJOJNJ[F UIF BDUJWF EVUZ QFSJPE

8J 'J 3BEJP BOE #BTFCBOE

5IF &41 8J 'J 3BEJP BOE #BTFCBOE TVQQPSU UIF GPMMPXJOH GFBUVSFT

t C H O

t O .$4 JO CPUI .)[BOE .)[CBOEXJEUI

t O .$4 39

t O T HVBSE JOUFSWBM

t VQ UP .CQT PG EBUB SBUF

t 3FDFJWJOH 45#$ š

t 6Q UP E#N PG USBOTNJUUJOH QPXFS

t "EKVTUBCMF USBOTNJUUJOH QPXFS

t "OUFOOB EJWFSTJUZ
&41 TVQQPSUT BOUFOOB EJWFSTJUZ XJUI BO FYUFSOBM 3' TXJUDI 0O
BOE TFMFDUT UIF CFTU BOUFOOB UP NJOJNJ[F UIF FGGFDUT PG DIBOOFM

8J 'J ."$

5IF &41 8J 'J ."$ BQQMJFT MPX MFWFM QSPUPDPM GVODUJPOT BVUPNBUJD

t š WJSUVBM 8J 'J JOUFSGBDFT

t 4JNVMUBOFPVT *OGSBTUSVDUVSF #44 4UBUJPO NPEF 4PGU"1 NPEF 1SP

t 354 QSPUFDUJPO $54 QSPUFDUJPO *NNFEJBUF #MPDL "$,

t %FGSBHNFOUBUJPO

t 59 39" .1%6 39" .4%6

t 5901

t 8..

t $$.1 $#$."$ DPVOUFS NPEF 5,*1 .*$ 3$ 8"1* 4.4 8&1 3$ BOE $3

t "VUPNBUJD CFBDPO NPOJUPSJOH IBSEXBSF 54'

#MVFUPPUI

5IF DIJQ JOUFHSBUFT B #MVFUPPUI MJOL DPOUSPMMFS BOE #MVFUPPUI CB
BOE PUIFS MPX MFWFM MJOL SPVUJOFT TVDI BT NPEVMBUJPO EFNPEVMBU
GSFRVFODZ IPQQJOH FUD

#MVFUPPUI 3BEJP BOE #BTFCBOE

5IF #MVFUPPUI 3BEJP BOE #BTFCBOE TVQQPSU UIF GPMMPXJOH GFBUVSFT

t $MBTT DMBTT BOE DMBTT USBOTNJU PVUQVU QPXFST BOE B EZOB

t %214, BOE %14, NPEVMBUJPO

t)JHI QFSGPSNBODF JO /;*' SFDFJWFS TFOTJUJWJUZ XJUI PWFS E#N PG

t $MBTT PQFSBUJPO XJUIPVU FYUFSOBM 1"

t *OUFSOBM 43". BMMPXT GVMM TQFFE EBUB USBOTGFS NJYFE WPJDF BC

- -PHJD GPS GPSXBSE FSSPS DPSSFDUJPO IFBEFS FSSPS DPOUSPM BDD
  FODSZQUJPO CJU TUSFBN HFOFSBUJPO XIJUFOJOH BOE USBOTNJU QVM
- "$- 4$0 F4$0 BOE "')
- " MBXMBX BOE $74% EJHJUBM BVEJP $0%&$ JO 1$. JOUFSGBDF
- 4#$ BVEJP $0%&$
- 1PXFS NBOBHFNFOU GPS MPX QPXFS BQQMJDBUJPOT
- 4.1 XJUI CJU "&4

#MVFUPPUI *OUFSGBDF

- 1SPWJEFT 6"35)$* JOUFSGBDF VQ UP .CQT
- 1SPWJEFT 4%*0 41*)$* JOUFSGBDF
- 1SPWJEFT 1$. *¨4 BVEJP JOUFSGBDF

#MVFUPPUI 4UBDL

5IF #MVFUPPUI TUBDL PG UIF DIJQ JT DPNQMJBOU XJUI UIF #MVFUPPUI W
TQFDJGJDBUJPOT

#MVFUPPUI -JOL $PNQPOFOUT

5IF MJOL DPOUSPMMFS PQFSBUFT JO UISFF NBKPS TUBUFT TUBOECZ DPO
BOE PUIFS PQFSBUJPOT TVDI BT JORVJSZ QBHF BOE TFDVSF TJNQMF QBJ
4DBUUFSOFU #FMPX BSF UIF GFBUVSFT

- $MBTTJD #MVFUPPUI
  - %FWJDF %JTDPWFSZ JORVJSZ BOE JORVJSZ TDBO
  - $POOFDUJPO FTUBCMJTINFOU QBHF BOE QBHF TDBO
  - .VMUJ DPOOFDUJPOT
  - "TZODISPOPVT EBUB SFDFQUJPO BOE USBOTNJTTJPO
  - 4ZODISPOPVT MJOLT 4$0 F4$0
  - .BTUFS 4MBWF 4XJUDI
  - "EBQUJWF 'SFRVFODZ)PQQJOH BOE $IBOOFM BTTFTTNFOU
  - #SPBEDBTU FODSZQUJPO
  - "VUIFOUJDBUJPO BOE FODSZQUJPO
  - 4FDVSF 4JNQMF 1BJSJOH
  - .VMUJ QPJOU BOE TDBUUFSOFU NBOBHFNFOU
  - 4OJGG NPEF
  - $POOFDUJPOMFTT 4MBWF #SPBEDBTU USBOTNJUUFS BOE SFDFJWFS
  - &OIBODFE QPXFS DPOUSPM

- o 1JOH
- t #MVFUPPUI -PX &OFSHZ
  - o "EWFSUJTJOH
  - o 4DBOOJOH
  - o 4JNVMUBOFPVT BEWFSUJTJOH BOE TDBOOJOH
  - o .VMUJQMF DPOOFDUJPOT
  - o "TZODISPOPVT EBUB SFDFQUJPO BOE USBOTNJTTJPO
  - o "EBQUJWF 'SFRVFODZ)PQQJOH BOE $IBOOFM BTTFTTNFOU
  - o $POOFDUJPO QBSBNFUFS VQEBUF
  - o %BUB -FOHUI &YUFOTJPO
  - o -JOL -BZFS &ODSZQUJPO
  - o -& 1JOH

35$ BOE -PX 1PXFS .BOBHFNFOU

8JUI UIF VTF PG BEWBODFE QPXFS NBOBHFNFOU UFDIOPMPHJFT &41 DBO NPEFT

- t 1PXFS NPEFT
  - o "DUJWF NPEF DIJQ SBEJP JT QPXFSFE PO 5IF DIJQ DBO SFDFJWF USB
  - o .PEFN TMFFQ NPEF 5IF $16 JT PQFSBUJPOBM BOE UIF DMPDL JT DPOGJHVSE CBTFCBOE BOE SBEJP BSF EJTBCMFE
  - o -JHIU TMFFQ NPEF 5IF $16 JT QBVTFE 5IF 35$ NFNPSZ BOE 35$ QFSJQIFSBMT DP QSPDFTTPS BSF SVOOJOH "OZ XBLF VQ FWFOUT ."$ IPTU 35$ UJ VQ UIF DIJQ
  - o %FFQ TMFFQ NPEF 5IF $16 JT PGG BOE UIF 35$ NFNPSZ BOE 35$ QFSJQIFSBMT BSF QPXFSF DPOOFDUJPO EBUB BSF TUPSFE JO UIF 35$ NFNPSZ 5IF 6-1 DP QSPDF
  - o)JCFSOBUJPO 5IF JEFBM .)[PTDJMMBUPS BOE 6-1 DP QSPDFTTPS SFDPWFSZ NFNPSZ JT QPXFSFE EPXO 0OMZ POF 35$ UJNFS PO UIF TM BDUJWF 5IF 35$ UJNFS PS UIF 35$ (1*0T DBO XBLF VQ UIF DIJQ GSPN U

5BCMF 1PXFS $POTVNQUJPO CZ 1PXFS .PEFT

1PXFS NPEF	%FTDSJQUJPO			1PXFS DPOTVNQUJPO
"DUJWF 3' XPSLJOH	8J 'J 5Y QBDLFUT			1MFBTF SFGFS UP 5BCMFT GPS EFUBJMT
	8J 'J #5 5Y QBDLFUT			
	8J 'J #5 3Y BOE MJTUFOJOH			
.PEFN TMFFQ	5IF $16 JT QPXFSFE PO	.)[	%VBM DPSF DIJQ "T N"	
			4JOHMF DPSF DIJQ T	
		.)[	%VBM DPSF DIJQ "T N"	
			4JOHMF DPSF DIJQ T	

1PXFS NPEF	%FTDSJQUJPO		1PXFS DPOTVNQUJPO
	/PSNBM TQFFE	%VBM DPSF DIJQ"T)[	N"
		4JOHMF DPSF DIJQ"T)[	N"
-JHIU TMFFQ			N"
%FFQ TMFFQ	5IF 6-1 DP QSPDFTTPS JT QPXFSFE PO		
	6-1 TFOTPS NPOJUPSFE QBUUFSO ! EVUZ		
	35$ UJNFS 35$ NFNPSZ		"
)JCFSOBUJPO	35$ UJNFS POMZ		"
1PXFS PGG	$)*1@16 JT TFU UP MPX MFWFM UIF DIJQ JT QPXFSFE PGG		

/PUF

- "NPOH UIF &41 TFSJFT PG 4P$T &41 % 8% 7 &41 % 8%2 7 &41 % 8% E IBWF B NBYJNVN $16 GSFRVFODZ PG .)[&41 % 8% &41 4 8% BOE &41 6 $16 GSFRVFODZ PG .)[
- 8IFO 8J 'J JT FOBCMFE UIF DIJQ TXJUDIFT CFUXFFO "DUJWF BOE .PEFN TMFFQ N DIBOHFT BDDPSEJOHMZ
- *O .PEFN TMFFQ NPEF UIF $16 GSFRVFODZ DIBOHFT BVUPNBUJDBMMZ 5IF GS UIF QFSJQIFSBMT VTFE
- %VSJOH %FFQ TMFFQ XIFO UIF 6-1 DP QSPDFTTPS JT QPXFSFE PO QFSJQIFS PQFSBUF
- 8IFO UIF TZTUFN XPSLT JO UIF 6-1 TFOTPS NPOJUPSFE QBUUFSO UIF 6-1 DP Q QFSJPEJDBMMZ BOE UIF "%$ XPSLT XJUI B EVUZ DZDMF PG TP UIF QPXFS DPO

1FSJQIFSBMT BOE 4FOTPST

%FTDSJQUJPOT PG 1FSJQIFSBMT BOE 4FOTPST

(FOFSBM 1VSQPTF *OQVU 0VUQVU *OUFSGBDF (1*0

&41 IBT (1*0 QJOT XIJDI DBO CF BTTJHOFE WBSJPVT GVODUJPOT CZ QSPI 5IFSF BSF TFWFSBM LJOET PG (1*0T EJHJUBM POMZ BOBMPH FOBCMFE DE (1*0T BOE $BQBDJUJWF UPVDI FOBCMFE (1*0T DBO CF DPOGJHVSFE BT EJH

.PTU PG UIF EJHJUBM (1*0T DBO CF DPOGJHVSFE BT JOUFSOBM QVMM VQ PS DPOGJHVSFE BT BO JOQVU UIF JOQVU WBMVF DBO CF SFBE UISPVHI UIF SFH PS MFWFM USJHHFS UP HFOFSBUF $16 JOUFSSVQUT .PTU PG UIF EJHJUBM * JODMVEJOH JOQVU BOE PVUQVU CVGGFST XJUI USJTUBUF DPOUSPM 5IFTF BT UIF 4%*0 6"35 41* FUD .PSF EFUBJMT DBO CF GPVOE JO UIF QFSJQIFSBM PQFSBUJPOT UIF (1*0T DBO CF TFU UP IPME UIFJS TUBUFT

"OBMPH UP %JHJUBM $POWFSUFST "%$

&41 JOUFHSBUFT CJU 4"3 "%$T BOE TVQQPSUT NFBTVSFNFOUT PO DIB 6-1 DPQSPDFTTPS JO &41 JT BMTP EFTJHOFE UP NFBTVSF WPMUBHF XIJM FOBCMFT MPX QPXFS DPOTVNQUJPO 5IF $16 DBO CF XPLFO VQ CZ B UISFTI USJHHFST

8JUI BQQSPQSJBUF TFUUJOHT UIF "%$T DBO CF DPOGJHVSFE UP NFBTVSF W

5BCMEFTDSJCFT UIF "%$ DIBSBDUFSJTUJDT

5BCMF "%$ $IBSBDUFSJTUJDT

1BSBNFUFS	%FTDSJQUJPO	.JO	.BY	6OJU
%/- %JGGFSFOUJBM OPOMJOFBSJUZ	35$ DPOUSPMMFS "%$ DPOOFDUFE UP BO FYUFSOBM O' DBQBDJUPS %$ TJHOBM JOQVU	o		-4#
*/- *OUFHSBM OPOMJOFBSJUZ	BNCJFOU UFNQFSBUVSF BU 8J 'J #5 PGG	o	«$	-4#
4BNQMJOH SBUF	35$ DPOUSPMMFS	o		LTQT
	%*(DPOUSPMMFS	o		.TQT

/PUFT

- t 8IFO BUUFO BOE UIF NFBTVSFNFOU SFTVMU JT BCPWF WPMUBHF BU XJMM CF XPSTF UIBO EFTDSJCFE JO UIF UBCMF BCPWF
- t 5P HFU CFUUFS %/- SFTVMUT VTFST DBO UBLF NVMUJQMF TBNQMJOH UF
- t 5IF JOQVU WPMUBHF SBOHF PG (1*0 QJOT XJUIJO 7%% 1 @35$ EPNBJO T DIBSBDUFSJTUJDT QSPWJEFE JO 5BCMF FYDFFE UIF NFBTVSFNFOU FSSPST NBZ CF JOUSPI QFSGPSNBODF NBZ CF BGGFDUFE

#Z EFGBVMU UIFSF BSF £ EJGGFSFODFT JO NFBTVSFE SFTVMUT CFUXFFO NFUIPET "%$ 3FTVMUT BGUFS DBMJCSBUJPO VTJOH 'PVS JOUFSOBM 7PMUBHF SFGFSFODFT WTFST NBZ BQQMZ PUIFS DBMJCSBUJPO NFUIPET QSPWJEFE JO &41 *%' PS

5BCMF "%$ $BMJCSBUJPO 3FTVMUT

1BSBNFU	%FTDSJQUJPO	.JO	.BY	6OJU
5PUBM FSSPS	"UUFO FGGFDUJWF NFBTVSFNFOU	SoB	HF	PGN 7
	"UUFO FGGFDUJWF NFBTVSFNFOU	SoB	HF	PGN 7
	"UUFO FGGFDUJWF NFBTVSFNFOU	SoB	HF	PGN 7
	"UUFO FGGFDUJWF NFBTVSFNFOU	SoB	HF	PGN 7

)BMM 4FOTPS

&41 JOUFHSBUFT B)BMM TFOTPS CBTFE PO BO / DBSSJFS SFTJTUPS 8IFO TFOTPS EFWFMPQT B TNBMM WPMUBHF MBUFSBMMZ PO UIF SFTJTUPS XIJDI

%JHJUBM UP "OBMPH $POWFSUFS %"$

5XP CJU %"$ DIBOOFMT DBO CF VTFE UP DPOWFSU UXP EJHJUBM TJHOBMT EFTJHO TUSVDUVSF JT DPNQPTFE PG JOUFHSBUFE SFTJTUPS TUSJOHT BOE JOQVU WPMUBHF SFGFSFODF 5IF UXP %"$ DIBOOFMT DBO BMTP TVQQPSU J

5PVDI 4FOTPS

&41 IBT DBQBDJUJWF TFOTJOH (1*0T XIJDI EFUFDU WBSJBUJPOT JOEVD XJUI B GJOHFS PS PUIFS PCKFDUT 5IF MPX OPJTF OBUVSF PG UIF EFTJHO B SFMBUJWFMZ TNBMM QBET UP CF VTFE "SSBZT PG QBET DBO BMTP CF VTFE EFUFDUFE 5IF DBQBDJUJWF TFOTJOH (1*0T BSF MJTUFE JO 5BCMF

5BCMF $BQBDJUJWF 4FOTJOH (1*0T "WBJMBCMF PO &41

$BQBDJUJWF TFOT	1JO OBNF
5	(1*0
5	(1*0
5	(1*0
5	.5%0
5	.5$,
5	.5%*
5	.5.4
5	(1*0
5	,@9/
5	,@91

6MUSB -PX 1PXFS $P QSPDFTTPS

5IF 6-1 QSPDFTTPS BOE 35$ NFNPSZ SFNBJO QPXFSFE PO EVSJOH UIF %FFQ DBO TUPSF B QSPHSBN GPS UIF 6-1 QSPDFTTPS JO UIF 35$ TMPX NFNPSZ UP UJNFST BOE JOUFSOBM TFOTPST EVSJOH UIF %FFQ TMFFQ NPEF 5IJT JT VT OFFET UP CF XPLFO VQ CZ BO FYUFSOBM FWFOU PS B UJNFS PS B DPNCJOB QPXFS DPOTVNQUJPO

&UIFSOFU ."$ *OUFSGBDF

"O *&&& DPNQMJBOU .FEJB "DDFTT $POUSPMMFS ."$ JT QSPWJEFE &41 SFRVJSFT BO FYUFSOBM QIZTJDBM JOUFSGBDF EFWJDF 1): UP DPOO FUD 5IF 1): JT DPOOFDUFE UP &41 UISPVHI TJHOBMT PG .** PS OJOF TJ TVQQPSUFE PO UIF &UIFSOFU ."$ &."$ JOUFSGBDF

- t .CQT BOE .CQT SBUFT
- t %FEJDBUFE %." DPOUSPMMFS BMMPXJOH IJHI TQFFE USBOTGFS CFUXFF
- t 5BHHFE ."$ GSBNF 7-"/ TVQQPSU
- t)BMG EVQMFY $4." $% BOE GVMM EVQMFY PQFSBUJPO
- t ."$ DPOUSPM TVCMBZFS DPOUSPM GSBNFT
- t CJU 3 HFOFSBUJPO BOE SFNPWBM
- t 4FWFSBM BEESFTT GJMUFSJOH NPEFT GPS QIZTJDBM BOE NVMUJDBTU E
- t CJU TUBUVT DPEF GPS FBDI USBOTNJUUFE PS SFDFJWFE GSBNF
- t *OUFSOBM '*'0T UP CVGGFS USBOTNJU BOE SFDFJWF GSBNFT 5IF USBOT XPSET CJU
- t)BSEXBSF 151 1SFDJTJPO 5JNF 1SPUPDPM JO BDDPSEBODF XJUI *&&&
- t .)[.)[DMPDL PVUQVU

4% 4%*0 ..$)PTU $POUSPMMFS

"O 4% 4%*0 ..$ IPTU DPOUSPMMFS JT BWBJMBCMF PO &41 XIJDI TVQQPSUT

- t 4FDVSF %JHJUBM NFNPSZ 4% NFN 7FSTJPO BOE 7FSTJPO
- t 4FDVSF %JHJUBM * 0 4%*0 7FSTJPO
- t $POTVNFS &MFDUSPOJDT "EWBODFE 5SBOTQPSU "SDIJUFDUVSF $& "5"
- t .VMUJNFEJB $BSET ..$ 7FSTJPO F..$ 7FSTJPO BOE 7FSTJPO

5IF DPOUSPMMFS BMMPXT VQ UP .)[DMPDL PVUQVU JO UISFF EJGGFSFOU TVQQPSUT UXP 4% 4%*0 ..$ DBSET JO B CJU EBUB CVT NPEF *U BMTP T 7

4%*0 41* 4MBWF $POUSPMMFS

&41 JOUFHSBUFT BO 4% EFWJDF JOUFSGBDF UIBU DPOGPSNT UP UIF JOEV BOE BMMPXT B IPTU DPOUSPMMFS UP BDDFTT UIF 4P$ VTJOH UIF 4%*0 C UIF TMBWF PO UIF 4%*0 CVT 5IF IPTU DBO BDDFTT UIF 4%*0 JOUFSGBDF SFH NFNPSZ WJB B %." FOHJOF UIVT NBYJNJ[JOH QFSGPSNBODF XJUIPVU FOHB

5IF 4%*0 41* TMBWF DPOUSPMMFS TVQQPSUT UIF GPMMPXJOH GFBUVSFT

- t 41* CJU 4%*0 BOE CJU 4%*0 USBOTGFS NPEFT PWFS UIF GVMM DMPD
- t $POGJHVSBCMF TBNQMJOH BOE ESJWJOH DMPDL FEHF
- t 4QFDJBM SFHJTUFST GPS EJSFDU BDDFTT CZ IPTU

- t *OUFSSVQUT UP IPTU GPS JOJUJBUJOH EBUB USBOTGFS
- t "VUPNBUJD MPBEJOH PG 4%*0 CVT EBUB BOE BVUPNBUJD EJTDBSEJOH P
- t #MPDL TJ[F PG VQ UP CZUFT
- t *OUFSSVQU WFDUPST CFUXFFO UIF IPTU BOE UIF TMBWF BMMPXJOH CP
- t 4VQQPSUT %." GPS EBUB USBOTGFS

6OJWFSTBM "TZODISPOPVT 3FDFJWFS 5SBOTNJUUFS 6"3

&41 IBT UISFF 6"35 JOUFSGBDFT J F 6"35 6"35 BOE 6"35 XIJDI QSPWJ DPNNVOJDBUJPO 34 BOE 34 BOE *S%" TVQQPSU DPNNVOJDBUJOH BU QSPWJEFT IBSEXBSF NBOBHFNFOU PG UIF $54 BOE 354 TJHOBMT BOE TPGUX UIF JOUFSGBDFT DBO CF BDDFTTFE CZ UIF %." DPOUSPMMFS PS EJSFDUMZ C

*¤$ *OUFSGBDF

&41 IBT UXP *¨$ CVT JOUFSGBDFT XIJDI DBO TFSWF BT *¨$ NBTUFS PS TMBW 5IF *¨$ JOUFSGBDFT TVQQPSU

- t 4UBOEBSE NPEF ,CJU T
- t 'BTU NPEF ,CJU T
- t 6Q UP .)[ZFU DPOTUSBJOFE CZ 4%" QVMM VQ TUSFOHUI
- t CJU CJU BEESFTTJOH NPEF
- t %VBM BEESFTTJOH NPEF

6TFST DBO QSPHSBN DPNNBOE SFHJTUFST UP DPOUSPM *¨$ JOUFSGBDFT T

*¤4 *OUFSGBDF

5XP TUBOEBSE *¨4 JOUFSGBDFT BSF BWBJMBCMF JO &41 5IFZ DBO CF PQF BOE IBMG EVQMFY DPNNVOJDBUJPO NPEFT BOE DBO CF DPOGJHVSFE UP PO SFTPMVUJPO BT JOQVU PS PVUQVU DIBOOFMT #$, DMPDL GSFRVFODZ GSP POF PS CPUI PG UIF *¨4 JOUFSGBDFT BSF DPOGJHVSFE JO UIF NBTUFS NPEF FYUFSOBM %"$ $0%&$

#PUI PG UIF *¨4 JOUFSGBDFT IBWF EFEJDBUFE %." DPOUSPMMFST 1%. BOE

*OGSBSFE 3FNPUF $POUSPMMFS

5IF JOGSBSFE SFNPUF DPOUSPMMFS TVQQPSUT FJHIU DIBOOFMT PG JOGSB QSPHSBNNJOH UIF QVMTF XBWFGPSN JU TVQQPSUT WBSJPVT JOGSBSFE QS CMPDL PG NFNPSZ UP TUPSF UIF USBOTNJUUJOH PS SFDFJWJOH XBWFGPSN

1VMTF $PVOUFS

5IF QVMTF DPVOUFS DBQUVSFT QVMTF BOE DPVOUT QVMTF FEHFT UISPVHI T XIJDI DBQUVSFT GPVS TJHOBMT BU B UJNF 5IF GPVS JOQVU TJHOBMT JODM 8IFO UIF DPVOUFS SFBDIFT B EFGJOFE UISFTIPME BO JOUFSSVQU JT HFOFS

1VMTF 8JEUI .PEVMBUJPO 18.

5IF 1VMTF 8JEUI .PEVMBUJPO 18. DPOUSPMMFS DBO CF VTFE GPS ESJWJOI
DPOUSPMMFS DPOTJTUT PG 18. UJNFST UIF 18. PQFSBUPS BOE B EFEJDBUF
UJNJOH JO TZODISPOPVT PS JOEFQFOEFOU GPSN BOE FBDI 18. PQFSBUPS H
DIBOOFM 5IF EFEJDBUFE DBQUVSF TVC NPEVMF DBO BDDVSBUFMZ DBQUVS

-&% 18.

5IF -&% 18. DPOUSPMMFS DBO HFOFSBUF JOEFQFOEFOU DIBOOFMT PG EJH
BOE EVUJFT

5IF DIBOOFMT PG EJHJUBM XBWFGPSNT PQFSBUF XJUI BO "1# DMPDL PG
PQUJPO PG VTJOH UIF .)[PTDJMMBUPS DMPDL &BDI DIBOOFM DBO TFMFDU
SBOHF XIJMF JUT BDDVSBDZ PG EVUZ DBO CF VQ UP CJUT XJUIJO B NT QF

5IF TPGUXBSF DBO DIBOHF UIF EVUZ JNNFEJBUFMZ .PSFPWFS FBDI DIBOO
EVUZ JODSFBTF PS EFDSFBTF XIJDI JT VTFGVM GPS UIF -&% 3(# DPMPS HSB

4FSJBM 1FSJQIFSBM *OUFSGBDF 41*

&41 GFBUVSFT UISFF 41*T 41*)41* BOE 741* JO TMBWF BOE NBTUFS NPEI
IBMG EVQMFY DPNNVOJDBUJPO NPEFT 5IFTF 41*T BMTP TVQQPSU UIF GPMI

- t 'PVS NPEFT PG 41* USBOTGFS GPSNBU XIJDI EFQFOE PO UIF QPMBSJUZ
  DMPDL
- t 6Q UP .)[5IF BDUVBM TQFFE JU DBO SFBDI EFQFOET PO UIF TFMFDUFE
  DIBSBDUFSJTUJDT FUD
- t VQ UP CZUF '*'0

"MM 41*T DBO BMTP CF DPOOFDUFE UP UIF FYUFSOBM GMBTI 43". BOE -$% &
DPOUSPMMFST

"DDFMFSBUPS

&41 JT FRVJQQFE XJUI IBSEXBSF BDDFMFSBUPST PG HFOFSBM BMHPSJUIN
16# 34" BOE &$$ XIJDI TVQQPSU JOEFQFOEFOU BSJUINFUJD TVDI BT
*OUFHFS .PEVMBS .VMUJQMJDBUJPO 5IF NBYJNVN PQFSBUJPO MFOHUI GPS
.PEVMBS .VMUJQMJDBUJPO JT CJUT

5IF IBSEXBSF BDDFMFSBUPST HSFBUMZ JNQSPWF PQFSBUJPO TQFFE BOE S
DPEF FODSZQUJPO BOE EZOBNJD EFDSZQUJPO XIJDI FOTVSFT UIBU DPEF J

1FSJQIFSBM 1JO $POGJHVSBUJPOT

5BCMF 1FSJQIFSBM 1JO $POGJHVSBUJPOT

*OUFSGBDF	4JHOBM	1JO	'VODUJPO
"%$	"%$ @$)	4&/403@71	5XP CJU 4"3 "%$T
	"%$ @$)	4&/403@$"11	
	"%$ @$)	4&/403@$"1/	
	"%$ @$)	4&/403@7/	
	"%$ @$)	,@91	
	"%$ @$)	,@9/	
	"%$ @$)	7%&5@	
	"%$ @$)	7%&5@	
	"%$ @$)	(1*0	
	"%$ @$)	(1*0	
	"%$ @$)	(1*0	
	"%$ @$)	.5%0	
	"%$ @$)	.5$,	
	"%$ @$)	.5%*	
	"%$ @$)	.5.4	
	"%$ @$)	(1*0	
	"%$ @$)	(1*0	
	"%$ @$)	(1*0	
%"$	%"$@	(1*0	5XP CJU %"$T
	%"$@	(1*0	
5PVDI 4FOTPS	506$)	(1*0	$BQBDJUJWF UPVDI TFOTPST
	506$)	(1*0	
	506$)	(1*0	
	506$)	.5%0	
	506$)	.5$,	
	506$)	.5%*	
	506$)	.5.4	
	506$)	(1*0	
	506$)	,@9/	
	506$)	,@91	
+5"(	.5%*	.5%*	+5"(GPS TPGUXBSF EFCVHHJOH
	.5$,	.5$,	
	.5.4	.5.4	
	.5%0	.5%0	

*OUFSGBDF	4JHOBM	1JO	'VODUJPO
4% 4%*0 ..$)P)TU $POUSPMMFS	)4 @$-,	.5.4	4VQQPSUT 4% NFNPSZ DBSE 7 T
	)4 @$.%	.5%0	
	)4 @%"5"	(1*0	
	)4 @%"5"	(1*0	
	)4 @%"5"	.5%*	
	)4 @%"5"	.5$,	
.PUPS 18.	18. @065a	"OZ (1*0 1JOT	5ISFF DIBOOFMT PG CJU UJNFST 18. XBWFGPSNT &BDI DIBOOFM IB PG PVUQVU TJHOBMT UISFF GBVM TJHOBMT UISFF FWFOU DBQUVSF UISFF TZOD TJHOBMT
	18. @065@a*/		
	18. @'-5@a*/		
	18. @'-5@a*/		
	18. @$"1@a*/		
	18. @$"1@a*/		
	18. @4:/$@a/		
	18. @4:/$@a/		
4%*0 41* 4MBWF $POUSPMMFS	4%@$-,	.5.4	4%*0 JOUFSGBDF UIBU DPOGPSNT JOEVTUSZ TUBOEBSE 4%*0 DBSI TQFDJGJDBUJPO
	4%@$.%	.5%0	
	4%@%"5"	(1*0	
	4%@%"5"	(1*0	
	4%@%"5"	.5%*	
	4%@%"5"	.5$,	
6"35	6 39%@JO	"OZ (1*0 1JOT	5XP 6"35 EFWJDFT XJUI IBSEXBSF GMPX DPOUSPM BOE %."
	6 $54@JO		
	6 %43@JO		
	6 59%@PVU		
	6 354@PVU		
	6 %53@PVU		
	6 39%@JO		
	6 $54@JO		
	6 59%@PVU		
	6 354@PVU		
	6 39%@JO		
	6 $54@JO		
	6 59%@PVU		
	6 354@PVU		
*¨$	* $&95 @4$-@JO	"OZ (1*0 1JOT	5XP *¨$ EFWJDFT JO TMBWF PS NBT
	* $&95 @4%"@JO		
	* $&95 @4$-@JO		
	* $&95 @4%"@JO		
	* $&95 @4$-@PVU		
	* $&95 @4%"@PVU		
	* $&95 @4$-@PVU		
	* $&95 @4%"@PVU		

*OUFSGBDF	4JHOBM	1JO	'VODUJPO
-&% 18.	MFED@IT@aTJH@PVU MFED@MTa@TJH@PVU	"OZ(1*0 1JOT	JOEFQFOEFOU DIBOOFMT! .)[DMPDL 35$ $-, %VUZ BDDVSBDZ
* 4	* 4 *@%"5a'@JO * 4 0@#$,@JO * 4 0@84@JO * 4 *@#$,@JO * 4 *@84@JO * 4 *@)@4:/$ * 4 *@7@4:/$ * 4 *@)@&/"#-& * 4 0@#$,@PVU * 4 0@84@PVU * 4 *@#$,@PVU * 4 *@84@PVU * 4 0@%"5"@PVU * 4 *@%"5a'@JO * 4 0@#$,@JO * 4 0@84@JO * 4 *@#$,@JO * 4 *@84@JO * 4 *@)@4:/$ * 4 *@7@4:/$ * 4 *@)@&/"#-& * 4 0@#$,@PVU * 4 0@84@PVU * 4 *@#$,@PVU * 4 *@84@PVU * 4 0@%"5"@PVU	"OZ(1*0 1JOT	4UFSFP JOQVU BOE PVUQVU GSPN DPEFD QBSBMMFM-$% EBUB PVUQ DBNFSB EBUB JOQVU
OGSBSFE 3FN.5F@4(@*/ $PNUSPMMFS 3.5@4*(@065	"OZ(1*0 1JOT	&JHIU DIBOOFMT GPS BO *3 USBOT SFDFJWFS PG WBSJPVT XBWFGPSN
(FOFSBM 1VSQPTF 41* 41*	)41*2@JO @PVU)41*%@JO @PVU)41*$-,@JO @PVU)41*@$4 @JO @PVU)41*@$4 @PVU 741*@$4 @PVU 741*2@JO @PVU 741*%@JO @PVU 741*$-,@JO @PVU 741*@$4 @JO @PVU 741*@$4 @PVU 741*@$4 @PVU	"OZ(1*0 1JOTt	4UBOEBSE 41* DPOTJTUT PG DMPD DIJQ TFMFDU .04* BOE .*40 5IFTF DBO CF DPOOFDUFE UP -$% BOE PU FYUFSOBM EFWJDFT 5IFZ TVQQPS GPMMPXJOH GFBUVSFT #PUI NBTUFS BOE TMBWF NPEF t 'PVS TVC NPEFT PG UIF 41* USE GPSNBU t $POGJHVSBCMF 41* GSFRVFOD t 6Q UP CZUFT PG '*'0 BOE %."

*OUFSGBDF	4JHOBM	1JO	'VODUJPO
1BSBMMFM 241*	41*)%	4%@%"5"@	4VQQPSUT 4UBOEBSE 41* %VBM 4 2VBE 41* UIBU DBO CF DPOOFDUFE FYUFSOBM GMBTI BOE 43".
	41*81	4%@%"5"@	
	41*$4	4%@$.%	
	41*$-,	4%@$-,	
	41*2	4%@%"5"@	
	41*%	4%@%"5"@	
	)41*$-,	.5.4	
	)41*$4	.5%0	
	)41*2	.5%*	
	)41*%	.5$,	
	)41*)%	(1*0	
	)41*81	(1*0	
	741*$-,	(1*0	
	741*$4	(1*0	
	741*2	(1*0	
	741*%	(1*0	
	741*)%	(1*0	
	741*81	(1*0	
&."$	&."$@59@$-,	(1*0	&UIFSOFU ."$ XJUI .** 3.** JOUFSG
	&."$@39@$-,	(1*0	
	&."$@59@&/	(1*0	
	&."$@59%	(1*0	
	&."$@59%	(1*0	
	&."$@59%	.5.4	
	&."$@59%	.5%*	
	&."$@39@&3	.5$,	
	&."$@39@%7	(1*0	
	&."$@39%	(1*0	
	&."$@39%	(1*0	
	&."$@39%	6 59%	
	&."$@39%	.5%0	
	&."$@$-,@065	(1*0	
	&."$@$-,@065@	1*0	
	&."$@59@&3	(1*0	
	&."$@.%$@PVU	"OZ (1*0 1JOT	
	&."$@.%*@JO	"OZ (1*0 1JOT	
	&."$@.%0@PVU	"OZ (1*0 1JOT	
	&."$@$34@PVU	"OZ (1*0 1JOT	
	&."$@$0-@PVU	"OZ (1*0 1JOT	

*OUFSGBDF	4JHOBM	1JO	'VODUJPO
1VMTF $PVOUFS	QDOU@TJH@DI @JO	"OZ (1*0 1JO	0QFSBUJOH JO TFWFO EJGGFSFOU QVMTF DPVOUFS DBQUVSFT QVMTF FEHFT
	QDOU@TJH@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@TJH@DI @JO		
	QDOU@DUSM@DI @JO		
	QDOU@DUSM@DI @JO		

&MFDUSJDBM $IBSBDUFSJTUJDT

"CTPMVUF .BYJNVN 3BUJOHT

4USFTTFT CFZPOE UIF BCTPMVUF NBYJNVN SBUJOHT MJTUFE JO UIF UBCMF EFWJDF 5IFTF BSF TUSFTT SBUJOHT POMZ BOE EP OPU SFGFS UP UIF GVOD UIS SFDPNNFOEFE PQFSBUJOH DPOEJUJPOT

5BCMF "CTPMVUF .BYJNVN 3BUJOHT

4ZNCPM	1BSBNFUFS	.JC	.BY	6OJU
7%%" 7%% 1 7%% 17@35$ 7%% 1 @$16 7%%@4%*0	7PMUBHF BQQMJFE UP QPXFS TVQQMZ QJOT QFS QQQ EPNBJO	o		7
*output	$VNVMBUJWF *0 PVUQVU DVSSFOU			N"
5store	4UPSBHF UFNQFSBUVSF	o		«$

5IF DIJQ XPSLFE QSPQFSMZ BGUFS B IPVS UFTU JO BNCJFOU UFNQFSBUVSF BU 7%% 1 @35$ 7%% 1 @$16 7%%@4%*0 PVUQVU IJHI MPHJD MFWFM UP HSPVOE

3FDPNNFOEFE 0QFSBUJOH $POEJUJPOT

5BCMF 3FDPNNFOEFE 0QFSBUJOH $POEJUJPOT

4ZNCPM	1BSBNFUFS	.JC	5Z	.BY	6OJU
7%%" 7%% 1[1]@35$ 7%% 1 7%%@4%*0 [2]	7PMUBHF BQQMJFE UP QPXFS TVQQMZ QJOT QFS QQQ EPNBJO				7
7%% 1 @$16	7PMUBHF BQQMJFE UP QPXFS TVQQMZ QJO				
*VDD	$VSSFOU EFMJWFSFE CZ FYUFSOBM QPXFS TVQQM				
5[3]	0QFSBUJOH UFNQFSBUVSF	o			«$

8IFO XSJUJOH F'VTF 7%% 1 @35$ TIPVME CF BU MFBTU 7

- 7%%@4%*0 XPSLT BT UIF QPXFS TVQQMZ GPS UIF SFMBUFE *0 BOE BMTP GPS "QQFOEJY. G UIJT EBUBTIFFU GPS NPSF EFUBJMT
- 7%%@4%*0 DBO CF TPVSDFE JOUFSOBMMZ CZ UIF &41 GSPN UIF 7%% 1 @35$
  - 8IFO 7%%@4%*0 PQFSBUFT BU 7 JU JT ESJWFO FJUIFS GSPN UIF 7%% 1 @35$ UIFSF XJMM CF TPNF WPMUBHF ESPQ GSPN 7%% 1 @35$
  - 8IFO 7%%@4%*0 PQFSBUFT BU 7 JU DBO CF HFOFSBUFE GSPN &41 T JO UIJT -%0 DBO PGGFS JT N" BOE UIF PVUQVU WPMUBHF SBOHF JT 7
- 7%%@4%*0 DBO BMTP CF ESJWFO CZ BO FYUFSOBM QPXFS TVQQMZ
- 1MFBTF SFGFS UP 1PXFS 4VQQMZ 3FDPNNFOEBUJPOT

5IF PQFSBUJOH UFNQFSBUVSF PG &41 % 8% BOE &41 6 8%) SBOHFT GSPN o FNCFEEFE JO UIFN 5IF PUIFS DIJQT JO UIJT TFSJFT IBWF OP FNCFEEFE GMBTI T o «$ «$

%$ $IBSBDUFSJTUJDT 7 ¡$

5BCMF %$ $IBSBDUFSJTUJDT 7 ¡$

4ZNCP	1BSBNFUFS	.JO	5Z(	.BY	6OJU
$IN	1JO DBQBDJUBODF				Q'
7IH	)JHI MFWFM JOQVU WPMUBHF	š7%%		7%%	7
7IL	-PX MFWFM JOQVU WPMUBHF	o		š7%%	7
ÍH	)JHI MFWFM JOQVU DVSSFOU				O"
ÍL	-PX MFWFM JOQVU DVSSFOU				O"
7OH	)JHI MFWFM PVUQVU WPMUBHF	š7%%			7
7OL	-PX MFWFM PVUQVU WPMUBHF			š7%%	7
ÎOH	)JHI MFWFM TPVSDF DVSSFOU PVUQVU ESJWF TUSFOHUI TFU UP UIF NBYJNVN	7%% 1 @$16 QPXFS EPNBJO			N"
		7%% 1 @35$ QPXFS EPNBJO			N"
		7%%@4%*0 QPXFS EPNBJO			N"
ÎOL	-PX MFWFM TJOL DVSSFOU PVUQVU ESJWF TUSFOHUI TFU UP UIF NBYJNVN	7%% 7 7			N"
3PU	3FTJTUBODF PG JOUFSOBM QVMM VQ SFTJTUPS				L
3PD	3FTJTUBODF PG JOUFSOBM QVMM EPXO SFTJTUPS				L
7IL @RST	-PX MFWFM JOQVU WPMUBHF PG $)*1@16 UP QPXFS PGG UIF DIJQ				7

/PUFT

1MFBTF TFF 5BCMF %$ $IBSBDUFSJTUJDT 7 ¡$ JT UIF * 0 WPMUBHF GPS B QBSUJD

'PS 7%% 1 @$16 BOE 7%% 1 @35$ QPXFS EPNBJO QFS QJO DVSSFOU TPVSDFE J GSPN BSPVOE N" UP BSPVOE 7 BT UIF OVNCFS PG DVSSFOU TPVSDF QJOT JOD

'PS 7%%@4%*0 QPXFS EPNBJO QFS QJO DVSSFOU TPVSDFE JO UIF TBNF EPNBJO BSPVOE N" 7 7 BT UIF OVNCFS PG DVSSFOU TPVSDF QJOT JODSFBTFT

3FMJBCJMJUZ 2VBMJGJDBUJPOT

5BCMF 3FMJBCJMJUZ 2VBMJGJDBUJPOT

3FMJBCJMJUZ UFTUT	4UBOEBSET	5FTU DPOEJUJPO	3FTVMU
&MFDUSP 4UBUJD %JTDIBSHF 4FOTJUJWJUZ &4% $IBSHF %FWJDF .PEF $%.	+&%&$&*" +&4%	$£ 7 BMM QJOT	1BTT
&MFDUSP 4UBUJD %JTDIBSHF 4FOTJUJWJUZ &4%)VNBO #PEZ .PEF)#.	+&%&$&*" +&4%	"£ 7 BMM QJOT	1BTT
-BUDI VQ 0WFS DVSSFOU WPMUBHF	+&%&$&*" 45"/%"3% /0	£ N"a£ N" SPPN UFNQFSBUVSF UFTU GPS *0	1BTT
-BUDI VQ 0WFS WPMUBHF	+&%&$&*" 45"/%"3% /0	š7NBY SPPN UFNQFS BUVSF UFTU GPS 7	1BTT
.PJTUVSF 4FOTJUJWJUZ	+-4VWM .4-4-	«$ 3) IPVST *3š ! «$	1BTT

&TQFSTTJG 4ZTUFNT

&41 4FSJFT %BUBTIFFU W

4VCNJU %PDVNFOUBUJPO 'FFECBDL

+&%&$ EPDVNFOU +&1 TUBUFT UIBU 7 $%. BMMPXT TBGF NBOVGBDUVSJOH X
+&%&$ EPDVNFOU +&1 TUBUFT UIBU 7)#. BMMPXT TBGF NBOVGBDUVSJOH XJ

3' 1PXFS $POTVNQUJPO 4QFDJGJDBUJPOT

5IF QPXFS DPOTVNQUJPO NFBTVSFNFOUT BSF UBLFO XJUI B 7 TVQQMZ BU
QPSU "MM USBOTNJUUFST NFBTVSFNFOUT BSF CBTFE PO B EVUZ DZDMF

5BCMF 3' 1PXFS $POTVNQUJPO 4QFDJGJDBUJPOT

.PEF		.JC	5ZQ	.BY	6OJU
5SBOTNJU	C %444 .CQT 1065	E#N			N"
5SBOTNJU	H 0'%. .CQT 1065 E#N				N"
5SBOTNJU	O 0'%..$4 1065 E#N				N"
3FDFJWF	C H O		a		N"
5SBOTNJU #5 #-& 1065 E#N					N"
3FDFJWF #5 #-&			a		N"

8J 'J 3BEJP

5BCMF 8J 'J 3BEJP $IBSBDUFSJTUJDT

1BSBNFUFS	$POEJUJPO	.JC	5ZQ	.BY	6OJU
0QFSBUJOH GSFRVFODZ SBOHF note 1					.)[
0VUQVU JNQFEBODF note 2			OPUF		
59 QPXFS note 3	O .$4				E#N
	C NPEF				E#N
4FOTJUJWJUZ	C .CQT		o		E#N
	C .CQT		o		E#N
	H .CQT		o		E#N
	H .CQT		o		E#N
	O)5 .$4		o		E#N
	O)5 .$4		o		E#N
	O)5 .$4		o		E#N
	O)5 .$4		o		E#N
"EKBDFOU DIBOOFM SFKFDUJPO	H .CQT				E#
	H .CQT				E#
	O)5 .$4				E#
	O)5 .$4				E#

%FWJDF TIPVME PQFSBUF JO UIF GSFRVFODZ SBOHF BMMPDBUFE CZ SFHJPOBM SBOHF JT DPOGJHVSBCMF CZ TPGUXBSF

5IF UZQJDBM WBMVF PG &41 T 8J 'J SBEJP PVUQVU JNQFEBODF JT EJGGFSFOU &41 DIJQT XJUI B 2'/ š QBDLBHF UIF PVSB&41 JDIJQT XJUI B 2'/ š QBDLBHF UIF K

5BSHFU 59 QPXFS JT DPOGJHVSBCMF CBTFE PO EFWJDF PS DFSUJGJDBUJPO SFR

#MVFUPPUI 3BEJP

3FDFJWFS o #BTJD %BUB 3BUF

5BCMF 3FDFJWFS $IBSBDUFSJTUJDT o #BTJD %BUB 3BUF

1BSBNFUFS	$POEJUJPOT	.JC	5Z(	.BY	6OJU
4FOTJUJWJUZ ! #&3		o	o	o	E#N
.BYJNVN SFDFJWFE TJHOBM ! #&3					E#N
$P DIBOOFM $ *					E#
"EKBDFOU DIBOOFM TFMFDUJWJUZ $ *	' ' .)[			o	E#
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	' ' o .)[			o	E#
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0VU PG CBOE CMPDLJOH QFSGPSNBODF	.)[a .)[	o			E#N
	.)[a .)[	o			E#N
	.)[a .)[	o			E#N
	.)[a ()[	o			E#N
*OUFSNPEVMBUJPO		o			E#N

5SBOTNJUUFS o #BTJD %BUB 3BUF

5BCMF 5SBOTNJUUFS $IBSBDUFSJTUJDT o #BTJD %BUB 3

1BSBNFUFS	$POEJUJPOT	.JC	5Z(	.BY	6OJU
3'USBOTNJU QPXFS SFTFU 5BCMF					E#N
(BJO DPOUSPM TUFQ					E#
3'QPXFS DPOUSPM SBOHF		o			E#N
E# CBOEXJEUI					.)[
"EKBDFOU DIBOOFM USBOTNJU QPXFS	' ' £ .)[		o		E#N
	' ' £ .)[		o		E#N
	' ' £ .)[		o		E#N
$f1_{BWH}$					L)[
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*$'5			o		L)[
%SJGU SBUF					L)[T
%SJGU %)					L)[
%SJGU %)					L)[

/PUF
5IFSF BSF B UPUBM PG FJHIU QPXFS MFWFMT GSPN UP BOE UIF USBOTNJU QPXF
QPXFS MFWFM SJTFT CZ UIF USBOTNJU QPXFS JODSFBTFT CZ E# 1PXFS MFWFM
USBOTNJU QPXFS JT E#N

3FDFJWFS o &OIBODFE %BUB 3BUF

5BCMF 3FDFJWFS $IBSBDUFSJTUJDT o &OIBODFE %BUB 3E

1BSBNFUFS	$POEJUJPOT	.JC	5ZQ	.BY	6OJU
%214,					
4FOTJUJWJUZ ! #&3		o	o	o	E#N
.BYJNVN SFDFJWFE TJHOBM ! #&3					E#N
$P DIBOOFM $ *					E#
"EKBDFOU DIBOOFM TFMFDUJWJUZ $ *	' ' .)[		o		E#
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.BYJNVN SFDFJWFE TJHOBM ! #&3			o		E#N
$ * D DIBOOFM					E#
"EKBDFOU DIBOOFM TFMFDUJWJUZ $ *	' ' .)[				E#
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5SBOTNJUUFS o &OIBODFE %BUB 3BUF

5BCMF 5SBOTNJUUFS $IBSBDUFSJTUJDT o &OIBODFE %BUE

1BSBNFUFS	$POEJUJPOT	.JC	5ZQ	.BY	6OJU
3' USBOTNJU QPXFS FFSF5BCMF					E#N
(BJO DPOUSPM TUFQ					E#
3' QPXFS DPOUSPM SBOHF		o			E#N
%214, NBY X			o		L)[
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%214, NPEVMBUJPO BDDVSBDZ	3.4 %&7.				
	%&7.				
	1FBL %&7.				
%14, NPEVMBUJPO BDDVSBDZ	3.4 %&7.				
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	1FBL %&7.				

1BSBNFUFS	$POEJUJPOT	.JC	5ZQ	.BY	6OJU
*O CBOE TQVSJPVT FNJTTJPOT	' ' £ .)[		o		E#N
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&%3 EJGGFSFOUJBM QIBTF DPEJOH					

#MVFUPPUI -& 3BEJP

3FDFJWFS

5BCMF 3FDFJWFS $IBSBDUFSJTUJDT o #-&

1BSBNFUFS	$POEJUJPOT	.JC	5ZQ	.BY	6OJU
4FOTJUJWJUZ ! 1&3		o	o	o	E#N
.BYJNVN SFDFJWFE TJHOBM ! 1&3					E#N
$P DIBOOFM $ *					E#
"EKBDFOU DIBOOFM TFMFDUJWJUZ $ *	' ' .)[		o		E#
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	' ' .)[		o		E#
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0VU PG CBOE CMPDLJOH QFSGPSNBODF	.)[a .)[	o			E#N
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*OUFSNPEVMBUJPO		o			E#N

5SBOTNJUUFS

5BCMF 5SBOTNJUUFS $IBSBDUFSJTUJDT o #-&

1BSBNFUFS	$POEJUJPOT	.JC	5ZQ	.BY	6OJU
3'USBOTNJU QPXFS SET FSF 5BCMF					E#N
(BJO DPOUSPM TUFQ					E#
3'QPXFS DPOUSPM SBOHF		o			E#N
"EKBDFOU DIBOOFM USBOTNJU QPXFS	' ' £ .)[		o		E#N
	' ' £ .)[		o		E#N
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f1BWH					L)[
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*$'5			o		L)[
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