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FDMA1032CZ

July 2014

20V Complementary PowerTrench® MOSFET

General Description

This device is designed specifically as a single package solution for a DC/DC 'Switching' MOSFET in cellular handset and other ultra-portable applications. It features an independent N-Channel & P-Channel MOSFET with low on-state resistance for minimum conduction losses. The gate charge of each MOSFET is also minimized to allow high frequency switching directly from the controlling device. The MicroFET 2x2 package offers exceptional thermal performance for its physical size and is well suited to switching applications.

Features

■ Q1: N-Channel

3.7 A, 20V. $R_{DS(ON)} = 68 \text{ m}\Omega @ V_{GS} = 4.5V$

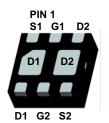
 $R_{DS(ON)} = 86 \text{ m}\Omega @ V_{GS} = 2.5V$

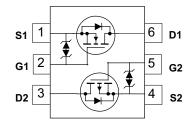
■ Q2: P-Channel

$$-3.1$$
 A, -20 V. R_{DS(ON)} = 95 m Ω @ V_{GS} = -4.5 V R_{DS(ON)} = 141 m Ω @ V_{GS} = -2.5 V

- Low profile 0.8 mm maximum in the new package MicroFET 2x2 mm
- HBM ESD protection level > 2 kV (Note 3)
 - Note 3)
- RoHS Compliant
- Free from halogenated compounds and antimony oxides







MicroFET 2x2 Absolute Maximum Ratings

T_A=25°C unless otherwise noted

<u> </u>					
Symbol	Parameter		Q1	Q2	Units
V _{DS}	Drain-Source Voltage		20	-20	V
V _{GS}	Gate-Source Voltage		±12	±12	V
i	Drain Current - Continuous	(Note 1a)	3.7	-3.1	А
I _D	– Pulsed		6	-6	
P _D	Power Dissipation for Single Operation (Note 1a)		1.4		W
		(Note 1b)	0	.7	
T _J , T _{STG}	Operating and Storage Junction Temperature Range		-55 to +150		°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	86 (Single Operation)	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1b)	173 (Single Operation)	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1c)	69 (Dual Operation)] 'C/\
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1d)	151 (Dual Operation)]

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
032	FDMA1032CZ	7"	8mm	3000 units

©2010 Fairchild Semiconductor Corporation FDMA1032CZ Rev B5 (W)

Symbol	Parameter	Test Conditions	Type	Min	Тур	Max	Units
Off Cha	racteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, \qquad I_D = 250 \mu\text{A} \\ V_{GS} = 0 \text{ V}, \qquad I_D = -250 \mu\text{A}$	Q1 Q2	20 –20			V
<u>ΔBV_{DSS}</u> ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C I_D = -250 μ A, Referenced to 25°C	Q1 Q2		15 –12		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 16 \text{ V}, \qquad V_{GS} = 0 \text{ V}$ $V_{DS} = -16 \text{ V}, \qquad V_{GS} = 0 \text{ V}$	Q1 Q2			1 –1	μΑ
I _{GSS}	Gate-Body Leakage	$V_{GS} = \pm 12 \text{ V}, \qquad V_{DS} = 0 \text{ V}$	All			±10	μА
On Chai	racteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS},$ $I_{D} = 250 \mu A$ $V_{DS} = V_{GS},$ $I_{D} = -250 \mu A$	Q1 Q2	0.6 -0.6	1.0 –1.0	1.5 –1.5	V
$\Delta V_{GS(th)} \over \Delta T_J$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C I_D = -250 μA, Referenced to 25°C	Q1 Q2		-4 4		mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	$V_{GS} = 4.5 \text{ V}, I_D = 3.7 \text{ A}$ $V_{GS} = 2.5 \text{ V}, I_D = 3.3 \text{ A}$ $V_{GS} = 4.5 \text{ V}, I_D = 3.7 \text{ A}, T_J = 125^{\circ}\text{C}$	Q1		37 50 53	68 86 90	mΩ
		$V_{GS} = -4.5V$, $I_D = -3.1$ A $V_{GS} = -2.5$ V, $I_D = -2.5$ A $V_{GS} = -4.5$ V, $I_D = -3.1$ A, $T_J = 125^{\circ}$ C	Q2		60 88 87	95 141 140	mΩ
g fs	Forward Transconductance	$V_{DS} = 10 \text{ V}, \qquad I_{D} = 3.7 \text{ A} $ $V_{DS} = -10 \text{ V}, \qquad I_{D} = -3.1 \text{ A}$	Q1 Q2		16 –11		S
Dynami	c Characteristics						
	Input Capacitance	Q1 V _{DS} = 10 V, V _{GS} = 0 V, f = 1.0 MHz	Q1 Q2		340 540		pF
C _{oss}	Output Capacitance	Q2	Q1 Q2		80 120		pF
C _{rss}	Reverse Transfer Capacitance	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1.0 \text{ MHz}$	Q1 Q2		60 100		pF
Switchir	ng Characteristics (Note	. 2)					
$t_{\text{d(on)}}$	Turn-On Delay Time	Q1 V _{DD} = 10 V, I _D = 1 A,	Q1 Q2		8 13	16 24	ns
t _r	Turn-On Rise Time	$V_{GS} = 4.5 \text{ V}, R_{GEN} = 6 \Omega$	Q1 Q2		8 11	16 20	ns
$t_{\text{d(off)}}$	Turn-Off Delay Time	$\begin{bmatrix} Q2 \\ V_{DD} = -10 \text{ V}, I_{D} = -1 \text{ A}, \end{bmatrix}$	Q1 Q2		14 37	26 59	ns
t _f	Turn-Off Fall Time	V_{GS} = -4.5 V, R_{GEN} = 6 Ω	Q1 Q2		3 36	6 58	ns
Q _g	Total Gate Charge	Q1 $V_{DS} = 10 \text{ V}, I_{D} = 3.7 \text{ A}, V_{GS} = 4.5 \text{ V}$	Q1 Q2		4 7	6 10	nC
Q _{gs}	Gate-Source Charge	Q2	Q1 Q2		0.7 1.1		nC
Q _{gd}	Gate-Drain Charge	$V_{DS} = -10 \text{ V}, I_{D} = -3.1 \text{ A},$ $V_{GS} = -4.5 \text{ V}$	Q1 Q2		1.1 2.4		nC

Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Туре	Min	Тур	Max	Units
Drain-S	Drain-Source Diode Characteristics and Maximum Ratings						
Is	Maximum Continuous Source-Drain Diode Forward Current		Q1 Q2			1.1 –1.1	Α
V_{SD}	Source-Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 1.1 \text{ A}$ (Note 2) $V_{GS} = 0 \text{ V}, I_S = -1.1 \text{ A}$ (Note 2)	Q1 Q2		0.7 -0.8	1.2 -1.2	V
t _{rr}	Diode Reverse Recovery Time	Q1 I _F = 3.7 A, dI _F /dt = 100 A/µs	Q1 Q2		11 25		ns
Q _{rr}	Diode Reverse Recovery Charge	Q2 I _F = -3.1 A, dI _F /dt = 100 A/µs	Q1 Q2		2 9		nC

- 1. $R_{\theta,JA}$ is determined with the device mounted on a 1 in² oz. copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta,JC}$ is guaranteed by design while $R_{\theta,JA}$ is determined by the user's board design.

 (a) $R_{\theta,JA} = 86$ °C/W when mounted on a 1 in² pad of 2 oz copper, 1.5 " x 1.5 " x 0.062 " thick PCB. For single operation.

 - (b) $\rm R_{\theta JA}$ = 173 °C/W when mounted on a minimum pad of 2 oz copper. For single operation.
 - (c) $R_{\theta JA}$ = 69 °C/W when mounted on a 1 in² pad of 2 oz copper, 1.5 " x 1.5 " x 0.062 " thick PCB. For dual operation.
 - (d) $R_{\theta JA}$ = 151 °C/W when mounted on a minimum pad of 2 oz copper. For dual operation.



- 2. Pulse Test : Pulse Width < 300 us, Duty Cycle < 2.0%
- 3. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

Typical Characteristics Q1 (N-Channel)

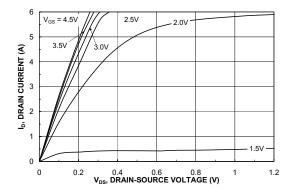


Figure 1. On-Region Characteristics.

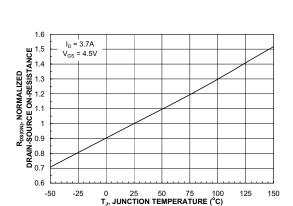


Figure 3. On-Resistance Variation with Temperature.

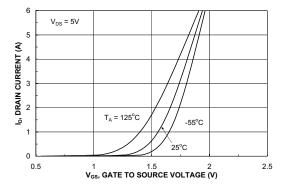


Figure 5. Transfer Characteristics.

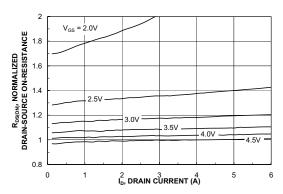


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

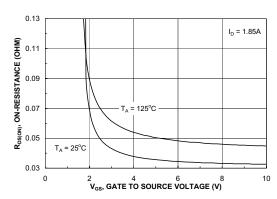


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

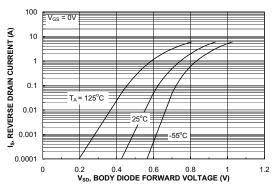
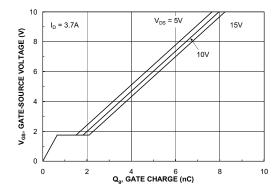


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics Q1 (N-Channel)

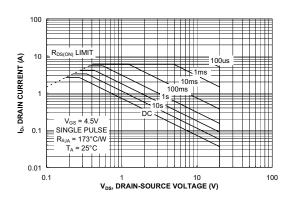


f = 1MHz V_{GS} = 0 V 400 **CAPACITANCE (pF)**000
002 100 $^{5}_{\mathrm{DS}}$, DRAIN TO SOURCE VOLTAGE (V)

500

Figure 7. Gate Charge Characteristics.

Figure 8. Capacitance Characteristics.



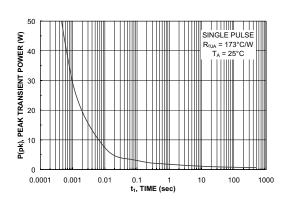


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

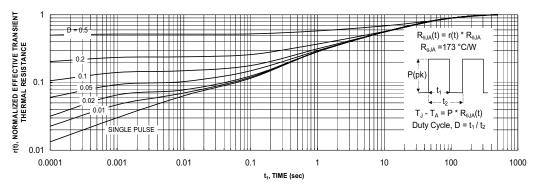


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.

Typical Characteristics: Q2 (P-Channel)

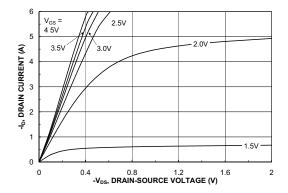


Figure 12. On-Region Characteristics.

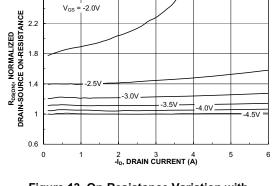


Figure 13. On-Resistance Variation with Drain Current and Gate Voltage.

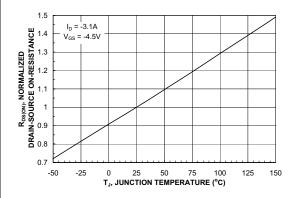


Figure 14. On-Resistance Variation with Temperature.

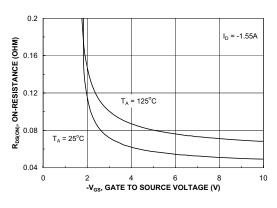


Figure 15. On-Resistance Variation with Gate-to-Source Voltage.

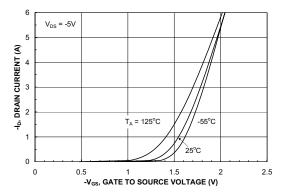


Figure 16. Transfer Characteristics.

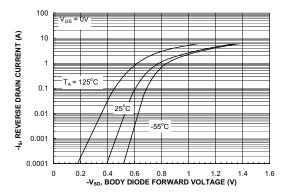
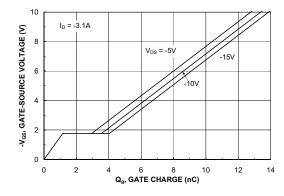


Figure 17. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics: Q2 (P-Channel)



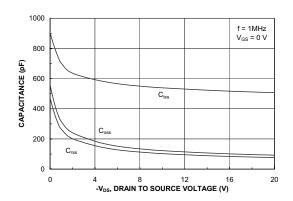
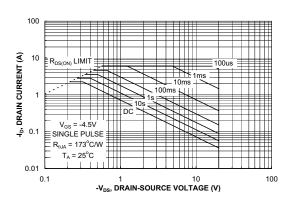


Figure 18. Gate Charge Characteristics.

Figure 19. Capacitance Characteristics.



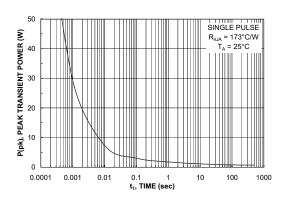


Figure 20. Maximum Safe Operating Area.

Figure 21. Single Pulse Maximum Power Dissipation.

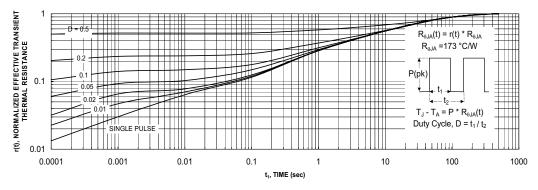
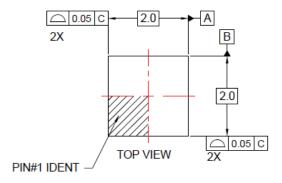
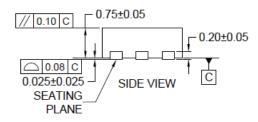


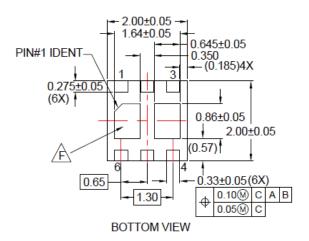
Figure 22. Transient Thermal Response Curve.

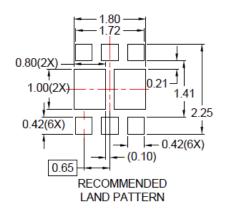
Thermal characterization performed using the conditions described in Note 1c. Transient thermal response will change depending on the circuit board design.

Dimensional Outline and Pad Layout









NOTES:

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- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
- E. DRAWING FILENAME: MKT-UMLP16Erev4
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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001:
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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