ZXMNS3BM832

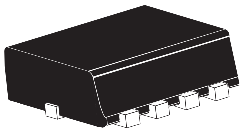
MPPS™ Miniature Package Power Solutions
30V N Channel MOSFET & 40V, 1A SCHOTTKY DIODE COMBINATION DUAL

SUMMARY

N Channel MOSFET--- $V_{(BR)DSS}$ =30V; $R_{SAT(on)}$ =0.18Ω; I_D = 2.7A
Schottky Diode --- V_R = 40V; V_F = 500mV (@1A); I_C=1A

DESCRIPTION

Packaged in the new innovation 3mm x 2mm MLP this combination dual product comprises a low gate drive, low on-resistance N-Channel MOSFET plus a fast-switching 1A Schottky barrier diode. This combination provides for highly efficient performance in a range of applications, including DC-DC conversion and low voltage power-management circuits.



3mm x 2mm Dual Die MLP

Users will also gain several other **key benefits**:

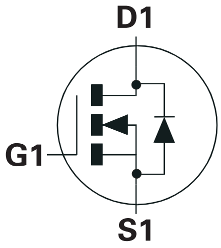
Performance capability equivalent to much larger packages

Improved circuit efficiency & power levels

PCB area and device placement savings

Lower package height (0.9mm nom)

Reduced component count



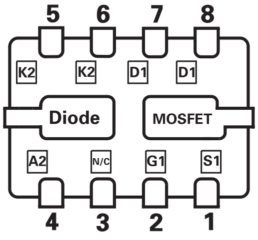
FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Extremely Low V_F, fast switching Schottky
- 3mm x 2mm MLP

APPLICATIONS

- DC - DC Converters
- Low voltage power-management

PINOUT



3mm x 2mm Dual MLP
underside view

ORDERING INFORMATION

DEVICE	REEL	TAPE WIDTH	QUANTITY PER REEL
ZXMNS3BM832TA	7′′	8mm	3000
ZXMNS3BM832TC	13′′	8mm	10000

DEVICE MARKING

MSA

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
MOSFET			
Drain-Source Voltage	V_{DSS}	30	V
Gate-Charge Voltage	V_{GS}	±12	V
Continuous Drain Current@V_{GS}=4.5V; T_A=25°C (b)(d)	I_D	2.72	A
@V_{GS}=4.5V; T_A=70°C (b)(d)		2.18	A
@V_{GS}=2.5V; T_A=25°C (a)(d)		2.00	A
Pulsed Drain Current (c)	I_{DM}	t.b.a	A
Source Current (Body Diode) @T_A=25°C (b)(d)	I_S	2.7	A
Pulsed Source Current (Body Diode)(c)	I_{SM}	t.b.a	A
Storage Temperature Range	T_{stg}	-55 to +150	°C
Junction Temperature	T_j	150	°C
Schottky Diode			
Continuous Reverse Voltage	V_R	40	V
Forward Current	I_F	1	A
Non Repetitive Forward Current t≤ 100μs	I_{FSM}	12	A
t≤ 10ms		5.2	A
Forward Voltage @ 1A	V_F	500	mV
Storage Temperature Range	T_{stg}	-55 to +150	°C
Junction Temperature	T_j	125	°C

Notes

(a) For a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper are is split down the centre line into two separate areas with one half connected to each half of the dual device.

(b) Measured at t<5 secs for a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached.** The copper are is split down the centre line into two separate areas with one half connected to each half of the dual device.

(c) For a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with minimal lead connections only**.

(d) For a dual device surface mounted on 10 sq cm single sided 1oz copper on FR4 PCB, in still air conditions **with all exposed pads attached attached**. The copper are is split down the centre line into two separate areas with one half connected to each half of the dual device.

(e) For a dual device surface mounted on 85 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached attached**. The copper are is split down the centre line into two separate areas with one half connected to each half of the dual device.

(f) For a dual device with one active die.

(g) For dual device with 2 active die running at equal power.

(h) Repetitive rating - pulse width limited by max junction temperature. Refer to Transient Thermal Impedance graph.

(i) The minimum copper dimensions required for mounting are no smaller than the exposed metal pads on the base if the device as shown in the package dimensions data. The thermal resistance for a dual device mounted on 1.5mm thick FR4 board using minimum copper 1 oz weight, 1mm wide tracks and one half of the device active is Rth = 250°C/W giving a power rating of Ptot = 500mW.

THERMAL PARAMETERS

PARAMETER	SYMBOL	VALUE	UNIT
Schottky			
Power Dissipation at TA=25°C (a)(d) Linear Derating Factor	P_D	1.2 12	W mW/°C
Transistor			
Power Dissipation at TA=25°C (a)(f) Linear Derating Factor	P_D	1.5 12	W mW/°C
Power Dissipation at TA=25°C (b)(f) Linear Derating Factor	P_D	2.9 23.2	W mW/°C
Power Dissipation at TA=25°C (c)(f) Linear Derating Factor	P_D	1 8	W mW/°C
Power Dissipation at TA=25°C (d)(f) Linear Derating Factor	P_D	1.13 8	W mW/°C
Power Dissipation at TA=25°C (d)(g) Linear Derating Factor	P_D	1.7 13.6	W mW/°C
Power Dissipation at TA=25°C (e)(g) Linear Derating Factor	P_D	3 24	W mW/°C

THERMAL RESISTANCE

PARAMETER	SYMBOL	VALUE	UNIT
Junction to Ambient (a)(f)	$R_{\theta JA}$	83.3	°C/W
Junction to Ambient (b)(f)	$R_{\theta JA}$	43	°C/W
Junction to Ambient (c)(f)	$R_{\theta JA}$	125	°C/W
Junction to Ambient (d)(f)	$R_{\theta JA}$	111	°C/W
Junction to Ambient (d)(g)	$R_{\theta JA}$	73.5	°C/W
Junction to Ambient (e)(g)	$R_{\theta JA}$	41.7	°C/W

Notes

(a) For a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper are is split down the centre line into two separate areas with one half connected to each half of the dual device.

(b) Measured at t<5 secs for a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached.** The copper are is split down the centre line into two separate areas with one half connected to each half of the dual device.

(c) For a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with minimal lead connections only**.

(d) For a dual device surface mounted on 10 sq cm single sided 1oz copper on FR4 PCB, in still air conditions **with all exposed pads attached attached**. The copper are is split down the centre line into two separate areas with one half connected to each half of the dual device.

(e) For a dual device surface mounted on 85 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached attached**. The copper are is split down the centre line into two separate areas with one half connected to each half of the dual device.

(f) For a dual device with one active die.

(g) For dual device with 2 active die running at equal power.

(h) Repetitive rating - pulse width limited by max junction temperature. Refer to Transient Thermal Impedance graph.

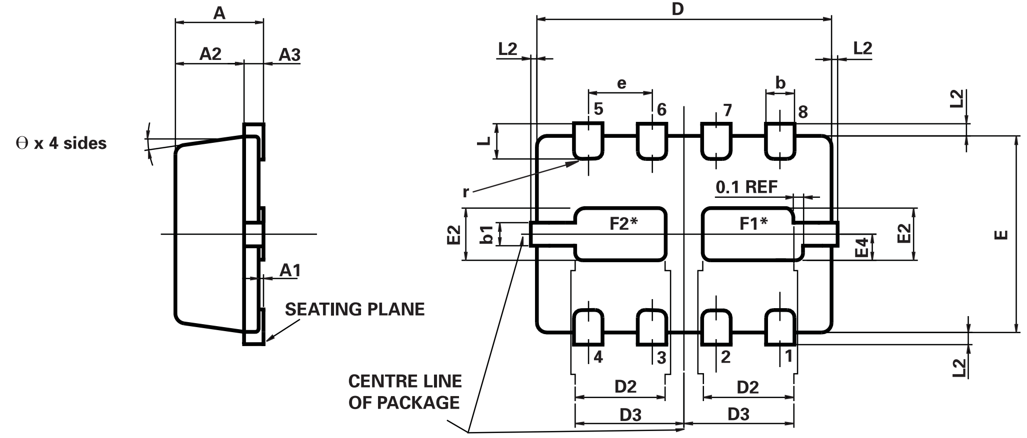
(i) The minimum copper dimensions required for mounting are no smaller than the exposed metal pads on the base if the device as shown in the package dimensions data. The thermal resistance for a dual device mounted on 1.5mm thick FR4 board using minimum copper 1 oz weight, 1mm wide tracks and one half of the device active is Rth = 250°C/W giving a power rating of Ptot = 500mW.

ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
MOSFET						
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	30			V	I_D=250μA, V_{GS}=0V
Zero Gate Voltage Drain Current	I_{DSS}			1	μA	V_{DS}=30V, V_{GS}=0V
Gate-Body Leakage	I_{GSS}			100	nA	V_{GS}=±20V, V_{DS}=0V
Gate-Source Threshold Voltage	$V_{GS(th)}$	0.7			V	I_D=250μA, V_{DS}= V_{GS}
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$		0.13 0.17	0.18 0.25	Ω Ω	V_{GS}=4.5V, I_D=1.5A V_{GS}=2.5V, I_D=1.3A
Forward Transconductance (1)(3)	g_{fs}		t.b.a		S	V_{DS}=15V,I_D=1.5A
DYNAMIC (3)						
Input Capacitance	C_{iss}		314		pF	V_{DS}=15 V, V_{GS}=0V, f=1MHz
Output Capacitance	C_{oss}		40		pF	
Reverse Transfer Capacitance	C_{rss}		23		pF	
SWITCHING(2) (3)						
Turn-On Delay Time	$t_{d(on)}$		1.1		ns	V_{DD} =15V, I_D=1A R_G=6.0Ω, V_{GS}=4.5V
Rise Time	t_r		1.5		ns	
Turn-Off Delay Time	$t_{d(off)}$		5.1		ns	
Fall Time	t_f		2.1		ns	
Total Gate Charge	Q_g		2.9		nC	V_{DS}=15V,V_{GS}=4.5V, I_D=1.5A
Gate-Source Charge	Q_{gs}		0.6		nC	
Gate-Drain Charge	Q_{gd}		0.8		nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (1)	V_{SD}		0.85	0.95	V	T_J=25°C, I_S=1.7A, V_{GS}=0V
Reverse Recovery Time (3)	t_{rr}		17.7		ns	T_J=25°C, I_F=2.7A, di/dt= 100A/μs
Reverse Recovery Charge (3)	Q_{rr}		13.0		nC	
SCHOTTKY DIODE ELECTRICAL CHARACTERISTICS						
Reverse Breakdown Voltage	$V_{(BR)R}$	40	60		V	I_R=300μA
Forward Voltage	V_F		240 265 305 355 390 425 495 420	270 290 340 400 450 500 600 —	mV mV mV mV mV mV mV mV	I_F=50mA* I_F=100mA* I_F=250mA* I_F=500mA* I_F=750mA* I_F=1000mA* I_F=1500mA* I_F=1000mA,T_a=100°C
Reverse Current	I_R		50	100	μA	V_R=30V
Diode Capacitance	C_D		25		pF	f=1MHz,V_R=25V
Reverse Recovery Time	t_{rr}		12		ns	switched from I_F=500mA to I_R=500mA Measured at I_R=50mA

NOTES:
(1) Measured under pulsed conditions. Width ≤300μs. Duty cycle ≤ 2% .
(2) Switching characteristics are independent of operating junction temperature.
(3) For design aid only, not subject to production testing.

MLP832 PACKAGE OUTLINE (3mm x 2mm Micro Leaded Package)



***Exposed Flags. Solder connection to improve thermal dissipation is optional.**
F1 at collector 1 potential
F2 at collector 2 potential

CONTROLLING DIMENSIONS IN MILLIMETRES
APPROX. CONVERTED DIMENSIONS IN INCHES

MLP832 PACKAGE DIMENSIONS

DIM	MILLIMETRES		INCHES		DIM	MILLIMETRES		INCHES	
	MIN.	MAX.	MIN.	MAX.		MIN.	MAX.	MIN.	MAX.
A	0.80	1.00	0.031	0.039	e	0.65 REF		0.0256 BSC	
A1	0.00	0.05	0.00	0.002	E	2.00 BSC		0.0787 BSC	
A2	0.65	0.75	0.0255	0.0295	E2	0.43	0.63	0.017	0.0249
A3	0.15	0.25	0.006	0.0098	E4	0.16	0.36	0.006	0.014
b	0.24	0.34	0.009	0.013	L	0.20	0.45	0.0078	0.0157
b1	0.17	0.30	0.0066	0.0118	L2	—	0.125	0.00	0.005
D	3.00 BSC		0.118 BSC		r	0.075 BSC		0.0029 BSC	
D2	0.82	1.02	0.032	0.040	Θ	0°	12°	0°	12°
D3	1.01	1.21	0.0397	0.0476					

Zetex plc
Fields New Road
Chadderton
Oldham, OL9 8NP
United Kingdom
Telephone (44) 161 622 4422
Fax: (44) 161 622 4420

Zetex GmbH
Streitfeldstraße 19
D-81673 München

Germany
Telefon: (49) 89 45 49 49 0
Fax: (49) 89 45 49 49 49

Zetex Inc
700 Veterans Memorial Hwy
Hauppauge, NY11788

USA
Telephone: (631) 360 2222
Fax: (631) 360 8222

Zetex (Asia) Ltd
3701-04 Metroplaza, Tower 1
Hing Fong Road
Kwai Fong
Hong Kong
Telephone: (852) 26100 611
Fax: (852) 24250 494

These offices are supported by agents and distributors in major countries world-wide.

For the latest product information, log on to **www.zetex.com**