

MOSFET – P-Channel POWERTRENCH®

-20 V, -6 A, 37 mΩ

FDME510PZT

General Description

This device is designed specifically for battery charging or load switching in cellular handset and other ultraportable applications. It features a MOSFET with low on-state resistance.

The MicroFET™ 1.6x1.6 Thin package offers exceptional thermal performance for its physical size and is well suited to switching and linear mode applications.

Features

- Max $r_{DS(on)}$ = 37 mΩ at $V_{GS} = -4.5$ V, $I_D = -5$ A
- Max $r_{DS(on)}$ = 50 mΩ at $V_{GS} = -2.5$ V, $I_D = -4$ A
- Max $r_{DS(on)}$ = 65 mΩ at $V_{GS} = -1.8$ V, $I_D = -3$ A
- Max $r_{DS(on)}$ = 100 mΩ at $V_{GS} = -1.5$ V, $I_D = -2$ A
- Low Profile: 0.55 mm Maximum in the New Package MicroFET 1.6x1.6 Thin
- Free from Halogenated Compounds and Antimony Oxides
- HBM ESD Protection Level > 2400 V (Note 3)
- These Devices are Pb-Free and are RoHS Compliant

MOSFET MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, Unless otherwise specified)

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	-20	V
V_{GS}	Gate to Source Voltage	±8	V
I_D	Drain Current Continuous ($T_A = 25^\circ\text{C}$) (Note 1a) Pulsed	-6 -15	A
P_D	Power Dissipation for Single Operation ($T_A = 25^\circ\text{C}$) (Note 1a) ($T_A = 25^\circ\text{C}$) (Note 1b)	2.1 0.7	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

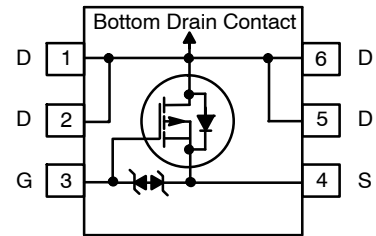
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

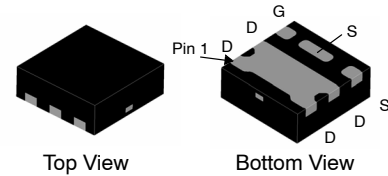
Symbol	Parameter	Ratings	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1b)	175	°C/W

V_{DS}	I_D MAX	$R_{DS(on)}$ MAX
-20 V	-6 A	37 mΩ

ELECTRICAL CONNECTION

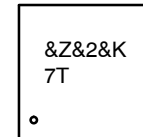


P-Channel MOSFET



MicroFET
(UDFN6)
CASE 517DV

MARKING DIAGRAM



- &Z = Assembly Plant Code
- &2 = 2-Digit Date Code (YW)
- &K = 2-Digit Lot Traceability Code
- 7T = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

FDME510PZT

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Shipping†
7T	FDME510PZT	MicroFET 1.6x1.6 Thin (Pb-Free / Halide Free)	5,000 units / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

B _V DSS	Drain to Source Breakdown Voltage	I _D = -250 μA, V _{GS} = 0 V	-20	-	-	V
ΔB _V DSS/ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = -250 μA, referenced to 25°C	-	-13	-	mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -16 V, V _{GS} = 0 V	-	-	-1	μA
I _{GSS}	Gate to Source Leakage Current	V _{GS} = ±8 V, V _{DS} = 0 V	-	-	±10	μA

ON CHARACTERISTICS

V _{GS(th)}	Gate to Source Threshold Voltage	V _{GS} = V _{DS} , I _D = -250 μA	-0.4	-0.5	-1.0	V
ΔV _{GS(th)} /ΔT _J	Gate to Source Threshold Voltage Temperature Coefficient	I _D = -250 μA, referenced to 25°C	-	3	-	mV/°C
r _{DS(on)}	Drain to Source On Resistance	V _{GS} = -4.5 V, I _D = -5 A V _{GS} = -2.5 V, I _D = -4 A V _{GS} = -1.8 V, I _D = -3 A V _{GS} = -1.5 V, I _D = -2 A V _{GS} = -4.5 V, I _D = -5 A, T _J = 125°C	-	31 38 48 57 40	37 50 65 100 60	mΩ
g _{FS}	Forward Transconductance	V _{DS} = -5 V, I _D = -5 A	-	21	-	S

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz	-	1120	1490	pF
C _{oss}	Output Capacitance		-	155	210	pF
C _{rss}	Reverse Transfer Capacitance		-	140	210	pF

SWITCHING CHARACTERISTICS

t _{d(on)}	Turn-On Delay Time	V _{DD} = -10 V, I _D = -5 A, V _{GS} = -4.5 V, R _{GEN} = 6 Ω	-	6.5	13	ns
t _r	Rise Time		-	10	16	ns
t _{d(off)}	Turn-Off Delay Time		-	93	149	ns
t _f	Fall Time		-	54	86	ns
Q _g	Total Gate Charge	V _{DD} = -10 V, I _D = -5 A V _{GS} = -4.5 V	-	16	22	nC
Q _{gs}	Gate to Source Gate Charge		-	1.6	-	nC
Q _{gd}	Gate to Drain "Miller" Charge		-	4	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS

V _{SD}	Source to Drain Diode Forward Voltage	V _{GS} = 0 V, I _S = -1.6 A (Note 2)	-	-0.6	-1.2	V
t _{rr}	Reverse Recovery Time	I _F = -5 A, di/dt = 100 A/μs	-	38	61	ns
Q _{rr}	Reverse Recovery Charge		-	16	29	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

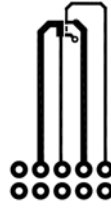
FDME510PZT

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR-4 material. $R_{\theta JC}$ is determined by the user's board design.



- a) 60°C/W when mounted on a 1 in² pad of 2 oz copper.



- b) 175°C/W when mounted on a minimum pad of 2 oz copper.

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

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TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

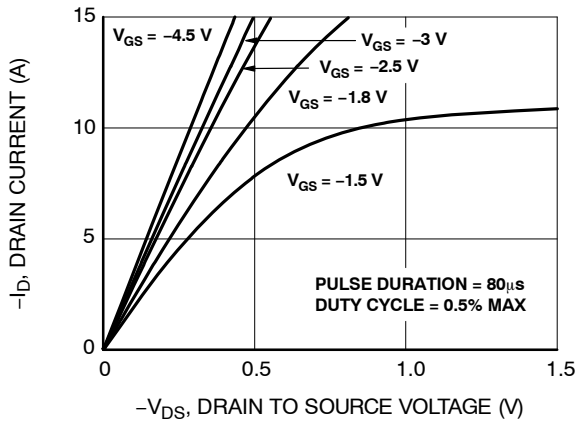


Figure 1. On-Region Characteristics

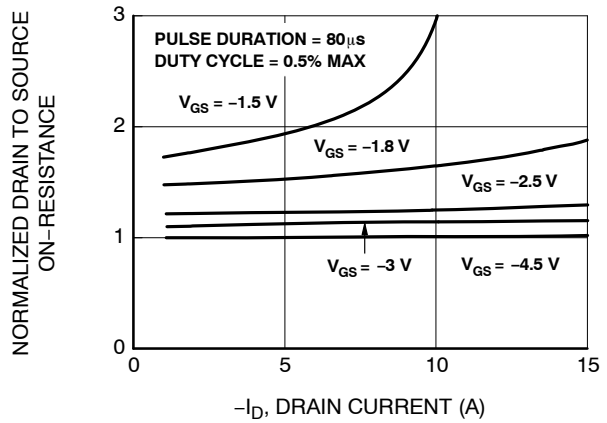


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

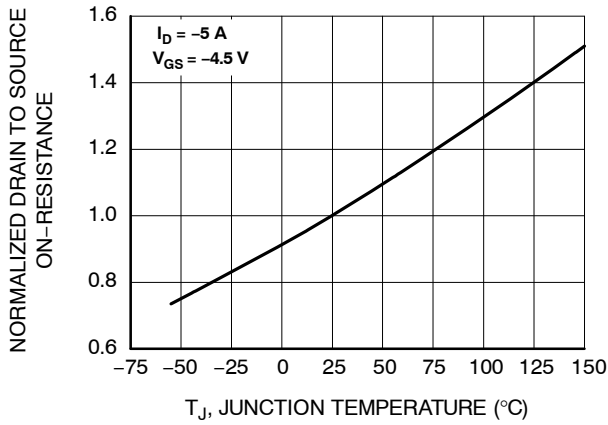


Figure 3. Normalized On Resistance vs. Junction Temperature

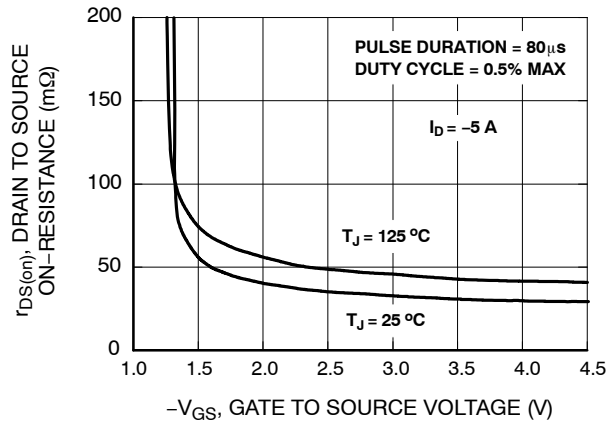


Figure 4. On-Resistance vs. Gate to Source Voltage

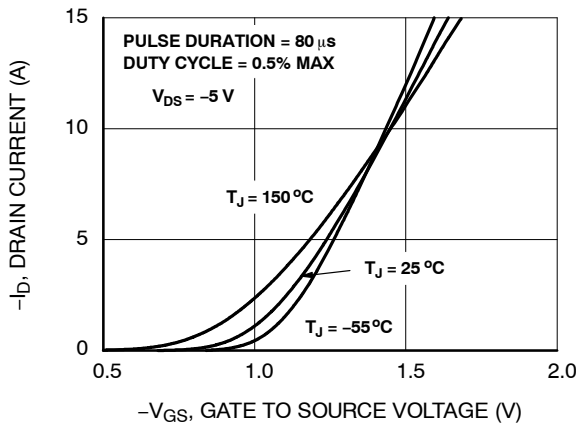


Figure 5. Transfer Characteristics

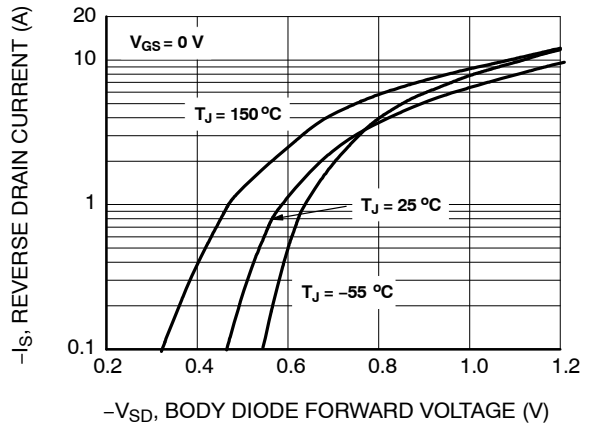


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise noted) (continued)

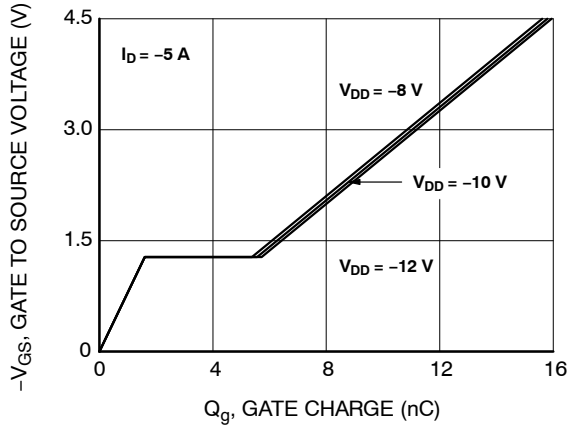


Figure 7. Gate Charge Characteristics

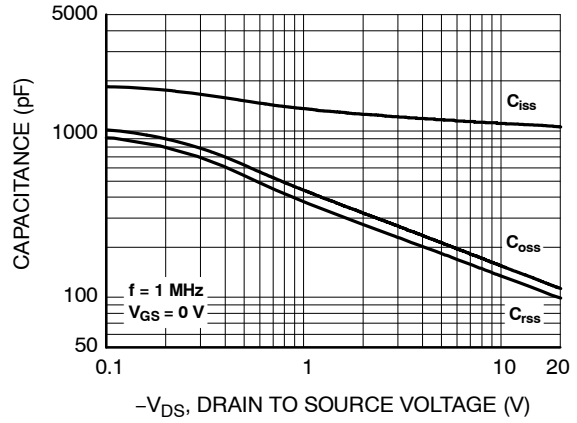


Figure 8. Capacitance vs. Drain to Source Voltage

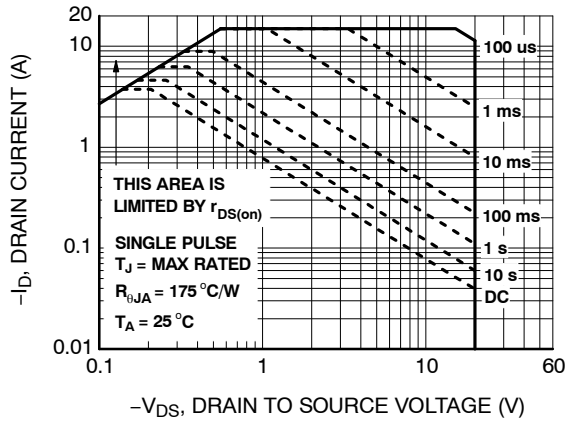


Figure 9. Forward Bias Safe Operating Area

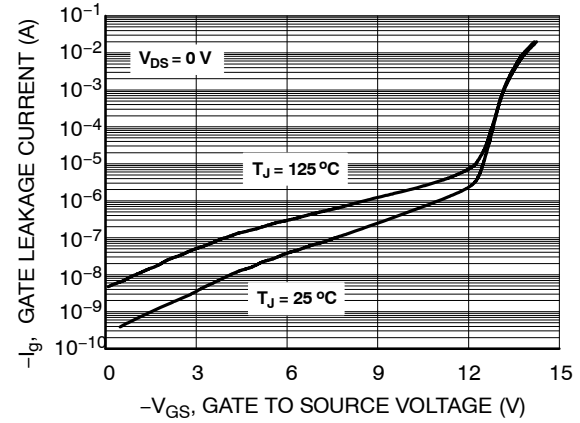


Figure 10. Gate Leakage Current vs. Gate to Source Voltage

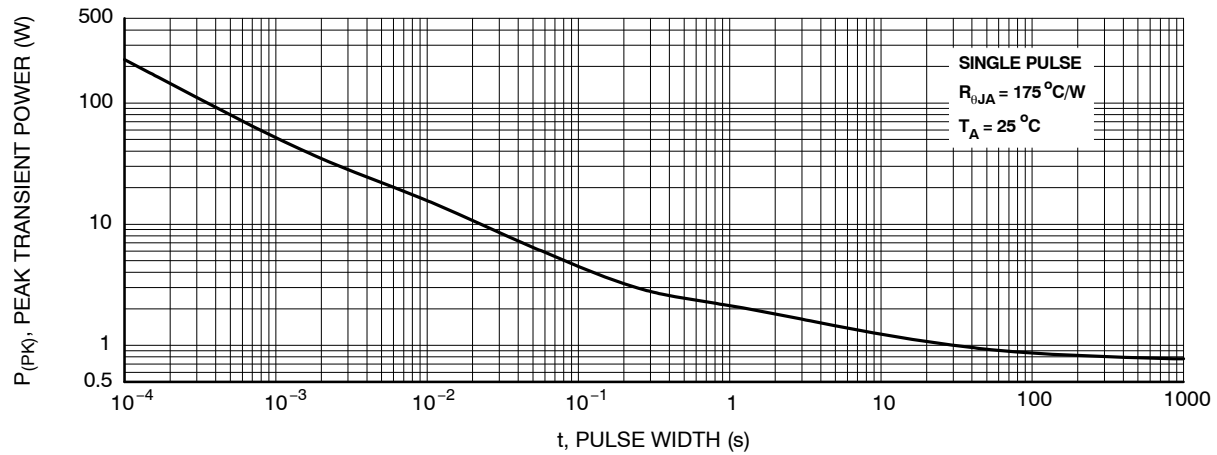


Figure 11. Single Pulse Maximum Power Dissipation

FDME510PZT

TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise noted) (continued)

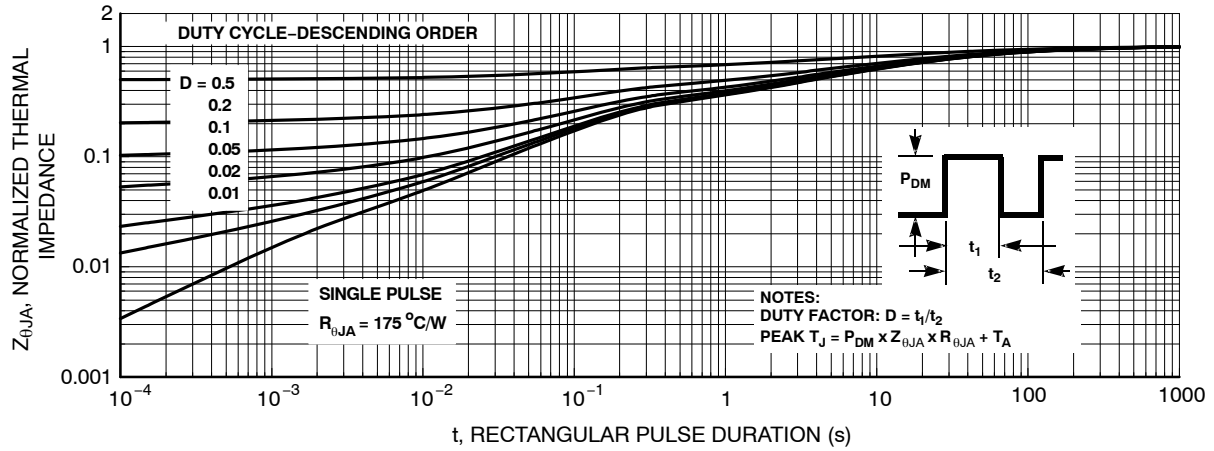
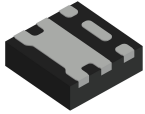
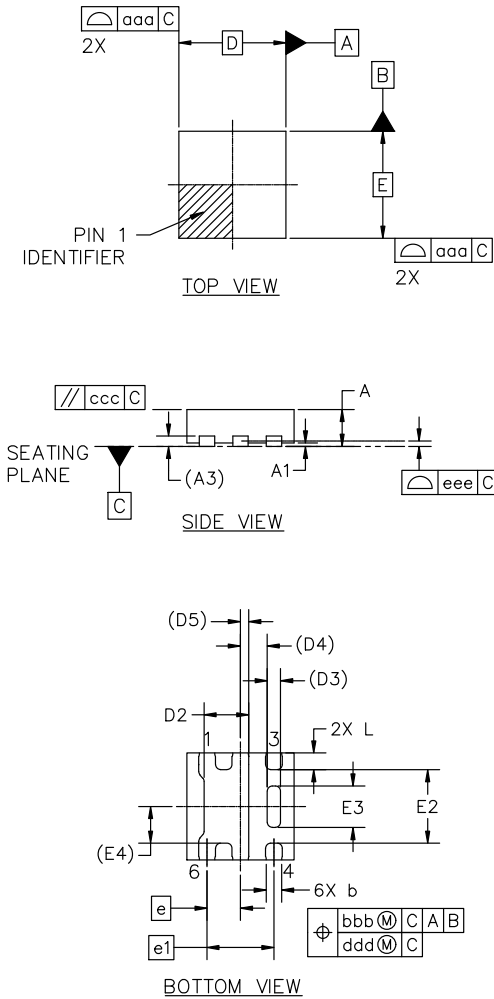


Figure 12. Junction-to-Ambient Transient Thermal Response Curve



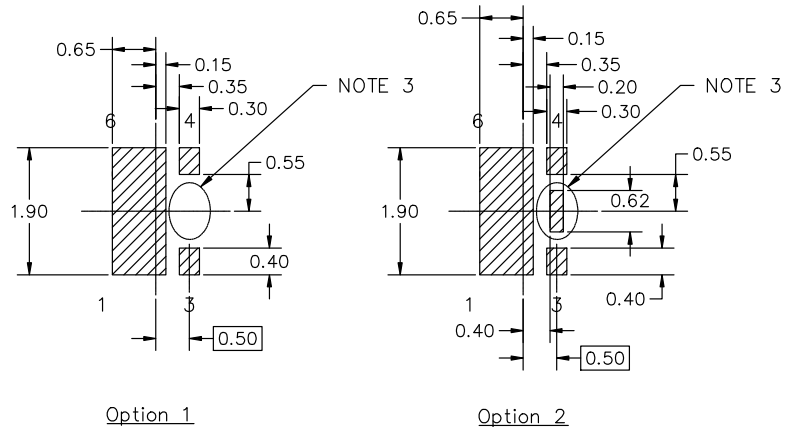
UDFN6 1.60x1.60x0.50, 0.50P
CASE 517DV
ISSUE A

DATE 31 OCT 2024



MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.45	0.50	0.55
A1	0.00	0.02	0.05
A3	0.15 REF		
D	1.60 BSC		
D2	0.62	0.67	0.72
D3	0.20 REF		
D4	0.40 REF		
D5	0.125 REF		
E	1.60 BSC		
E2	1.05	1.10	1.15
E3	0.57	0.62	0.67
E4	0.55 REF		
b	0.20	0.25	0.30
e	0.50 BSC		
e1	1.00 BSC		
L	0.20	0.25	0.30

TOLERANCE FORM AND POSITION	
aaa	0.10
bbb	0.10
ccc	0.10
ddd	0.05
eee	0.08



NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASMEY14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. NO VIAS OR TRACES ALLOWED IN THE AREA

RECOMMENDED MOUNTING FOOTPRINT

*For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference manual. SOLDERRM/D.

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DESCRIPTION:	UDFN6 1.60x1.60x0.50, 0.50P	PAGE 1 OF 1

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