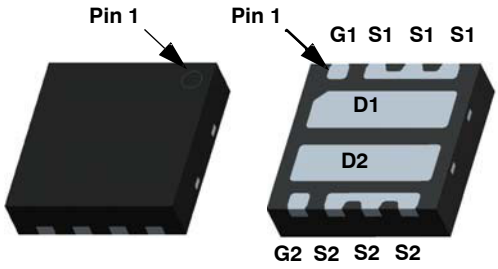
MOSFET – Dual N-Channel, POWERTRENCH®

60 V, 8.2 A, 17 mΩ

FDMC89521L



Power 33

WDFN8 3x3, 0.65P
CASE 511DG

General Description

This device includes two 60 V N−Channel MOSFETs in a dual Power 33 (3 mm x 3 mm MLP) package. The package is enhanced for exceptional thermal performance.

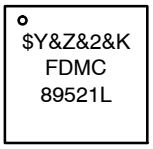
Features

- Max $r_{DS(on)}$ = 17 mΩ at V_{GS} = 10 V, I_D = 8.2 A
- Max $r_{DS(on)}$ = 27 mΩ at V_{GS} = 4.5 V, I_D = 6.7 A
- Termination is Lead−free
- These Devices are RoHS Compliant

Applications

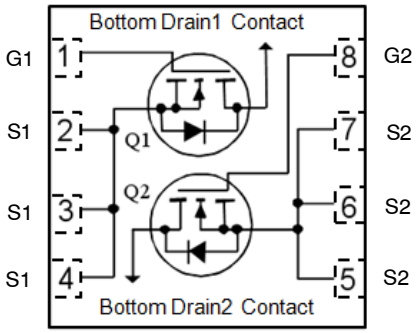
- Battery Protection
- Load Switching
- Bridge Topologies

MARKING DIAGRAM



$Y	= **onsemi** Logo
&Z	= Assembly Plant Code
&2	= Numeric Date Code
&K	= Lot Code
FDMC89521L	= Specific Device Code

PIN ASSIGNMENT



N−Channel MOSFET

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

MOSFET MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			60	V
V_{GS}	Gate to Source Voltage			±20	V
I_D	Drain Current – Continuous – Pulsed	T_A = 25°C	(Note 1a)	 8.2 40	A
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	32	mJ
P_D	Power Dissipation	T_C = 25°C		16	W
	Power Dissipation	T_A = 25°C	(Note 1a)	1.9	
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
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case	8.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 1a)	65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 1b)	155	°C/W

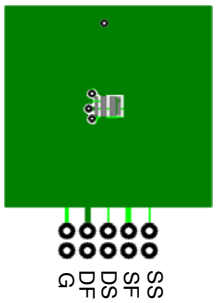
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		30		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	1	1.9	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		−6		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 8.2 A		13	17	mΩ
		V_{GS} = 4.5 V, I_D = 6.7 A		21	27	
		V_{GS} = 10 V, I_D = 8.2 A, T_J = 125°C		20	26	
g_{FS}	Forward Transconductance	V_{DD} = 10 V, I_D = 8.2 A		28		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 30 V, V_{GS} = 0 V, f = 1 MHz		1228	1635	pF
C_{oss}	Output Capacitance			243	325	pF
C_{rss}	Reverse Transfer Capacitance			10	15	pF
R_g	Gate Resistance			0.7		Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 30 V, I_D = 8.2 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		7.9	16	ns
t_r	Rise Time			2.1	10	ns
$t_{d(off)}$	Turn−Off Delay Time			18	33	ns
t_f	Fall Time			1.7	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 30 V, I_D = 8.2 A		17	24	nC
		V_{GS} = 0 V to 4.5 V, V_{DD} = 30 V, I_D = 8.2 A		7.9	12	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 30 V, I_D = 8.2 A		3.8		nC
Q_{gd}	Gate to Drain “Miller” Charge			1.9		nC
DRAIN−SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 8.2 A (Note 2)		0.85	1.3	V
		V_{GS} = 0 V, I_S = 1.6 A (Note 2)		0.75	1.2	
t_{rr}	Reverse Recovery Time	I_F = 8.2 A, di/dt = 100 A/μs		25	40	ns
Q_{rr}	Reverse Recovery Charge			11	20	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.

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR−4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 65°C/W when mounted on a 1 in^2 pad of 2 oz copper

b. 155°C/W when mounted on a minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. E_{AS} of 32 mJ is based on starting T_J = 25°C, L = 1 mH, I_{AS} = 8 A, V_{DD} = 54 V, V_{GS} = 10 V. 100% tested at L = 3 mH, I_{AS} = 5.4 A.

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

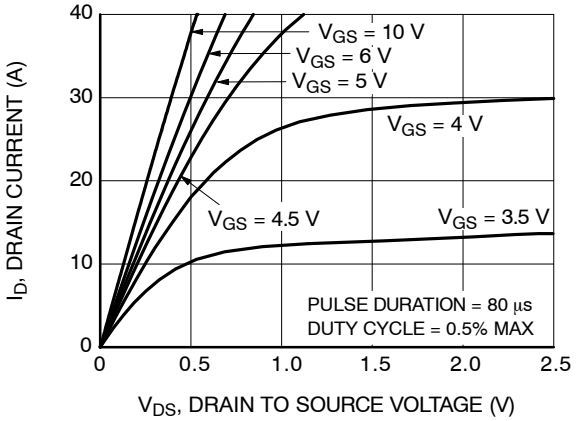


Figure 1. On−Region Characteristics

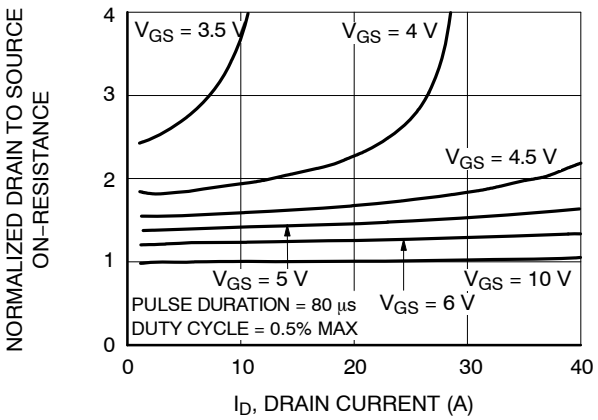


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

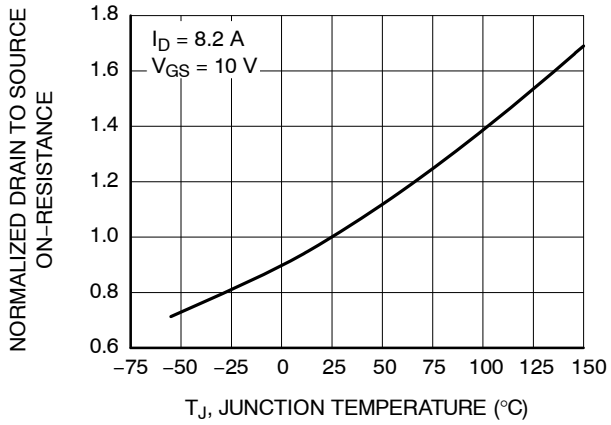


Figure 3. Normalized On−Resistance vs. Junction Temperature

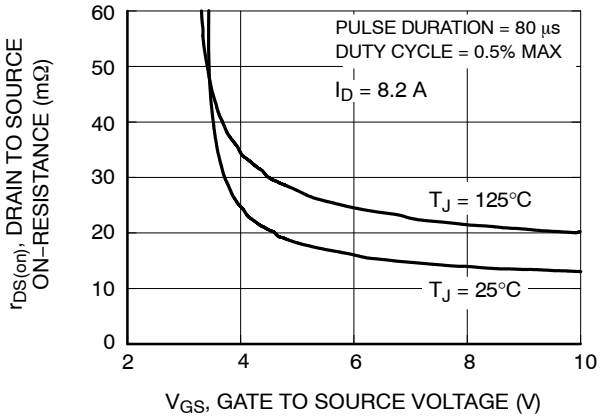


Figure 4. On−Resistance vs. Gate to Source Voltage

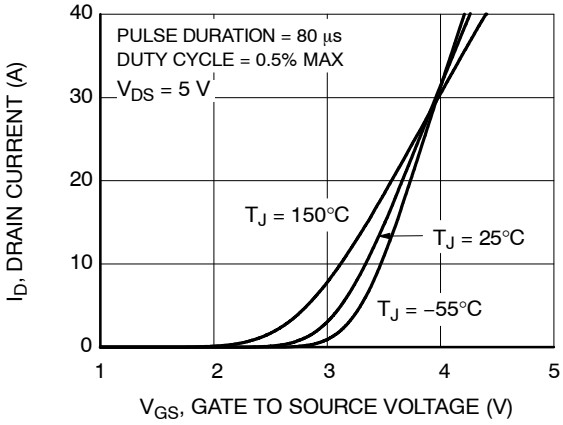


Figure 5. Transfer Characteristics

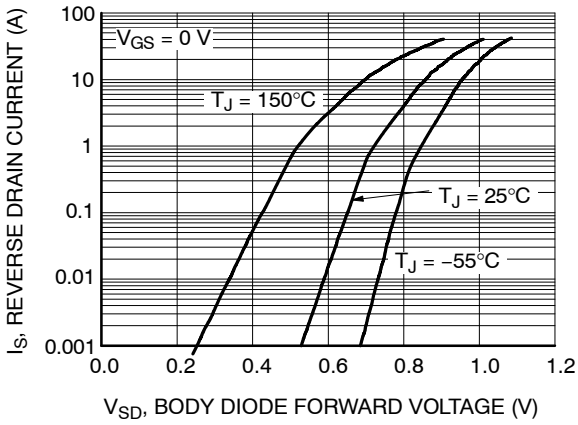


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

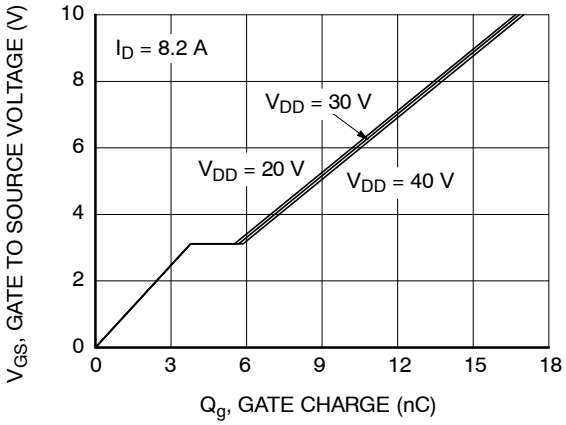


Figure 7. Gate Charge Characteristics

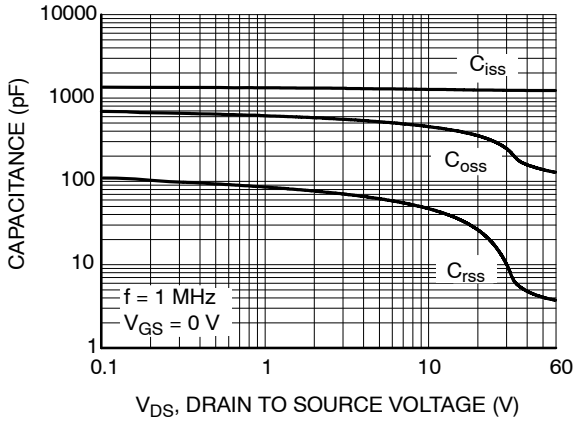


Figure 8. Capacitance vs. Drain to Source Voltage

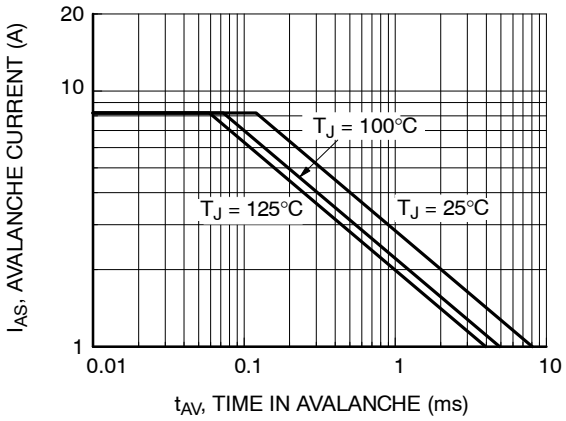


Figure 9. Unclamped Inductive Switching Capability

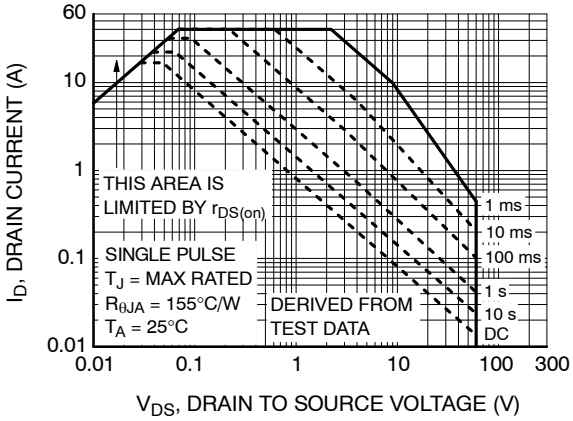


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

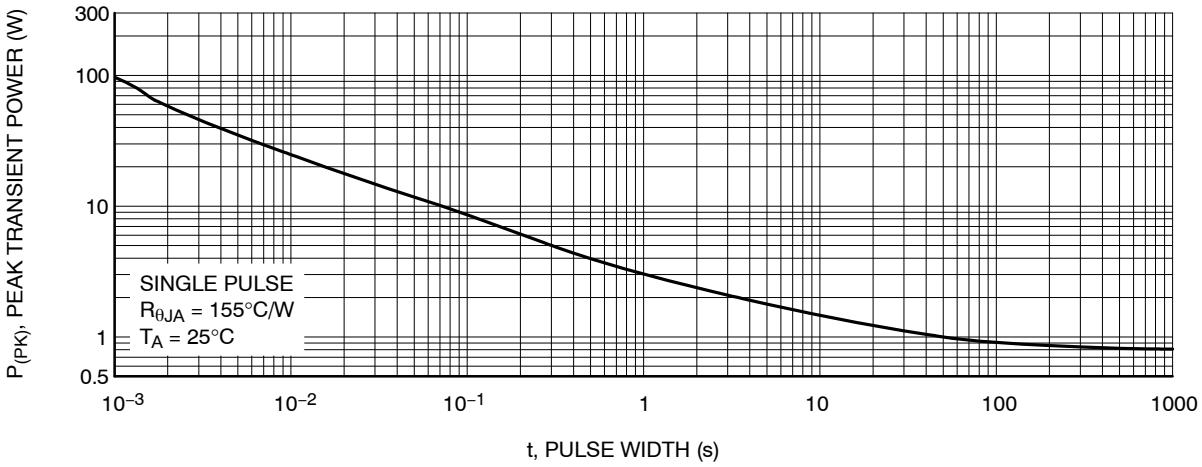


Figure 11. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

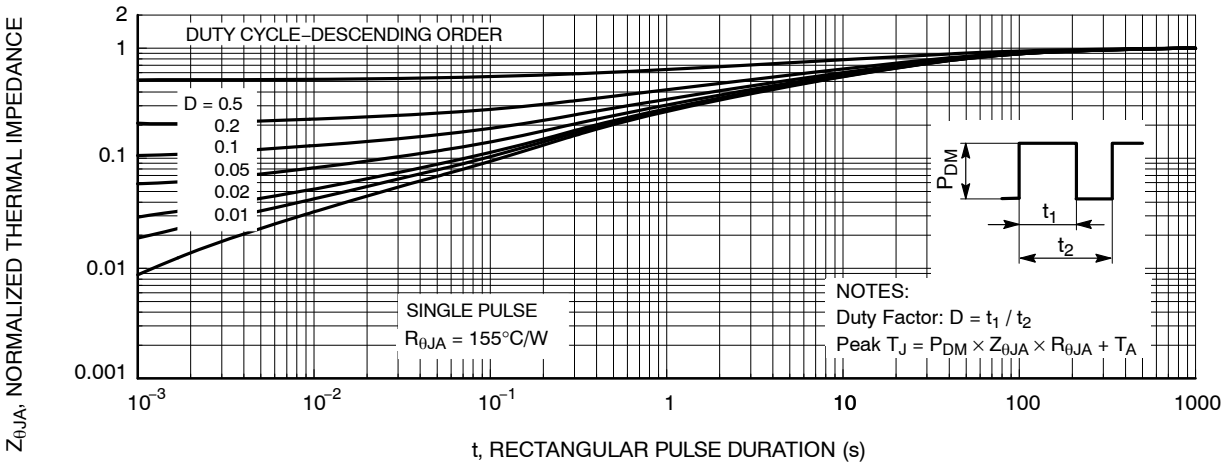
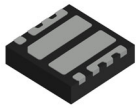


Figure 12. Junction−to−Case Transient Thermal Response Curve

ORDERING INFORMATION

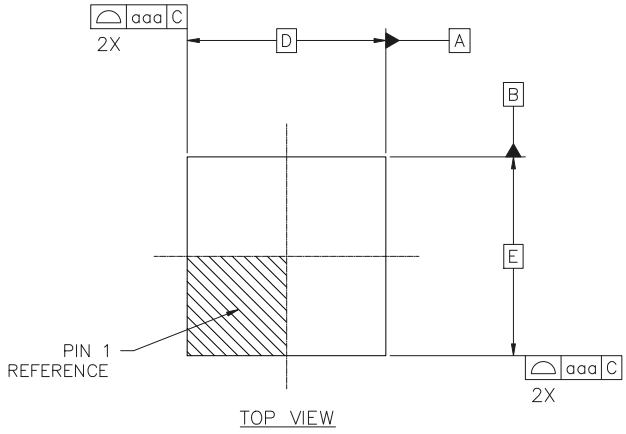
Device	Device Marking	Package Type	Shipping†
FDMC89521L	FDMC89521L	WDFN8 3x3, 0.65P (Pb−Free)	3000 / Tape & Reel

†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.

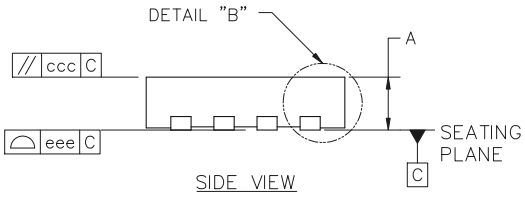


WDFN8 3.00x3.00x0.75, 0.65P
CASE 511DG
ISSUE B

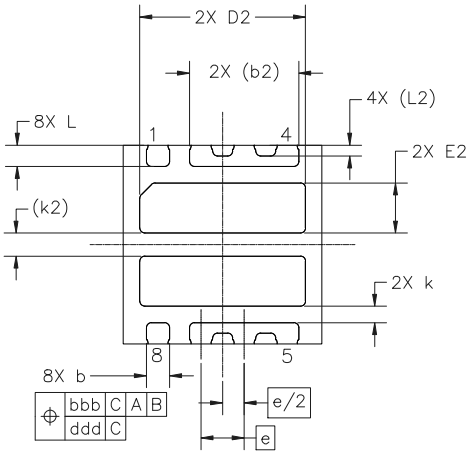
DATE 15 NOV 2024



TOP VIEW

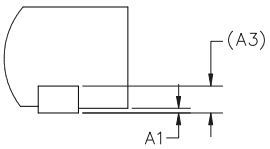


SIDE VIEW

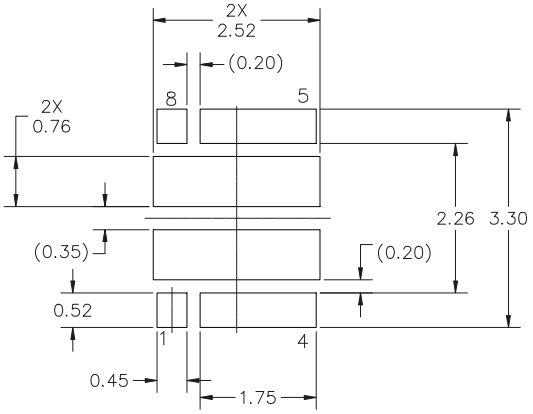


BOTTOM VIEW

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	---	0.05
A3	0.20 REF		
b	0.30	0.35	0.40
b2	1.65 REF		
D	3.00 BSC		
D2	2.45	2.50	2.55
E	3.00 BSC		
E2	0.71	0.76	0.81
e	0.65 BSC		
k	0.22	---	---
k2	0.35 REF		
L	0.27	0.32	0.37
L2	0.16 REF		
TOLERANCE FORM AND POSITION			
aaa	0.10		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.08		



DETAIL "B"
SCALE 2:1



RECOMMENDED MOUNTING FOOTPRINT

NOTES:
1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINALS AND IS MEASURED BETWEEN 0.15 AND 0.30MM FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

* 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:	**WDFN8 3.00x3.00x0.75, 0.65P**		**PAGE 1 OF 1**

ADDITIONAL INFORMATION

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