

MOSFET – N-Channel, POWERTRENCH® GreenBridge™ Series of High-Efficiency Bridge Rectifiers

60 V, 8 A, 17.5 mΩ

FDMQ86530L

General Description

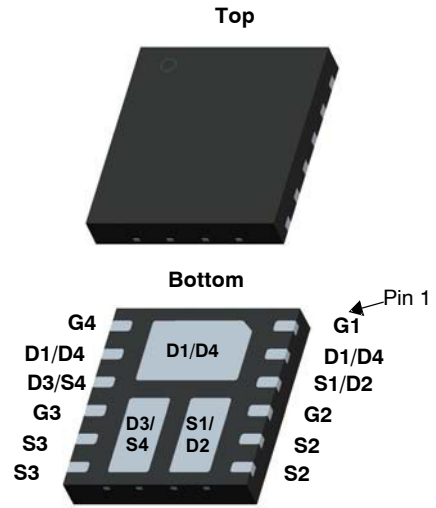
This Quad MOSFET solution provides ten-fold improvement in power dissipation over diode bridge.

Features

- Max $R_{DS(on)}$ = 17.5 mΩ at $V_{GS} = 10$ V, $I_D = 8$ A
- Max $R_{DS(on)}$ = 23 mΩ at $V_{GS} = 6$ V, $I_D = 7$ A
- Max $R_{DS(on)}$ = 25 mΩ at $V_{GS} = 4.5$ V, $I_D = 6.5$ A
- Substantial Efficiency Benefit in PD Solutions
- This Device is Pb-Free, Halide Free, and RoHS Compliant

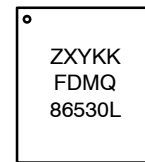
Applications

- Active Bridge
- Diode Bridge Replacement in 24 V & 48 V AC Systems

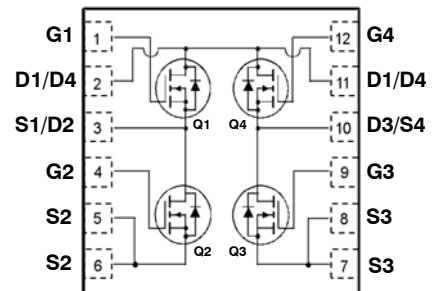


MLP 4.5x5

MARKING DIAGRAM



Z = Assembly Plant Code
 XY = Data Code (Year and Week)
 KK = Lot Traceability Code
 FDMQ86530L = Specific Device Code



ORDERING INFORMATION

Device	Package	Shipping†
FDMQ86530L	WDFN-12 (Pb-Free, Halide 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 Specification Brochure, [BRD8011/D](#).

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MOSFET MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Ratings	Unit	
V_{DS}	Drain to Source Voltage	60	V	
V_{GS}	Gate to Source Voltage	± 20	V	
I_D	Drain Current	Continuous	$T_C = 25^\circ\text{C}$	A
		Continuous (Note 1a)	$T_A = 25^\circ\text{C}$	
		Pulsed		
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	22	W
	Power Dissipation (Note 1a)	$T_A = 25^\circ\text{C}$	1.9	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$	

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)	65	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1b)	135	

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	60	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C	-	27	-	$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 48 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	± 100	nA

ON CHARACTERISTICS

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	1	1.8	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C	-	-6	-	$\text{mV}/^\circ\text{C}$
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 8 \text{ A}$	-	12	17.5	m Ω
		$V_{GS} = 6 \text{ V}, I_D = 7 \text{ A}$	-	15	23	
		$V_{GS} = 4.5 \text{ V}, I_D = 6.5 \text{ A}$	-	20	25	
		$V_{GS} = 10 \text{ V}, I_D = 8 \text{ A}, T_J = 125^\circ\text{C}$	-	18	26	
g_{FS}	Forward Transconductance	$V_{DS} = 5 \text{ V}, I_D = 8 \text{ A}$	-	28	-	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	1725	2295	pF
C_{oss}	Output Capacitance		-	299	400	pF
C_{rSS}	Reverse Transfer Capacitance		-	10	15	pF

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30 \text{ V}, I_D = 8 \text{ A}, V_{GS} = 10 \text{ V}, R_{GEN} = 6 \Omega$	-	8.8	18	ns
t_r	Rise Time		-	3.8	10	
$t_{d(off)}$	Turn-Off Delay Time		-	22	35	
t_f	Fall Time		-	2.8	10	

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

Q_g	Total Gate Charge	$V_{GS} = 0\text{ V to }10\text{ V}, V_{DD} = 30\text{ V}, I_D = 8\text{ A}$	-	23	33	nC
Q_g	Total Gate Charge	$V_{GS} = 0\text{ V to }4.5\text{ V}, V_{DD} = 30\text{ V}, I_D = 8\text{ A}$	-	11	16	
Q_{gs}	Gate to Charge	$V_{DD} = 30\text{ V}, I_D = 8\text{ A}$	-	5.1	-	
Q_{gd}	Gate to Drain "Miller" Charge		-	2.3	-	

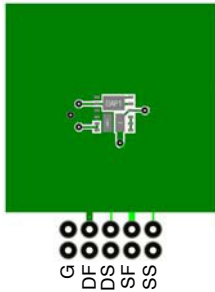
DRAIN-SOURCE DIODE CHARACTERISTICS

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 8\text{ A}$ (Note 2)	-	0.8	1.3	V
		$V_{GS} = 0\text{ V}, I_S = 1.6\text{ A}$ (Note 2)	-	0.7	1.2	
t_{rr}	Reverse Recovery Time	$I_F = 8\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	27	43	ns
Q_{rr}	Reverse Recovery Charge		-	12	22	nC

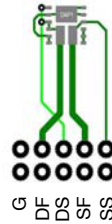
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

- $R_{\theta JA}$ is determined with the device mounted on a 1 in² 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. $65^\circ\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper the board designed Q1 + Q3 or Q2 + Q4.



b. $135^\circ\text{C}/\text{W}$ when mounted on a minimum pad of 2 oz copper the board designed Q1 + Q3 or Q2 + Q4.

- Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.

TYPICAL CHARACTERISTICS

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

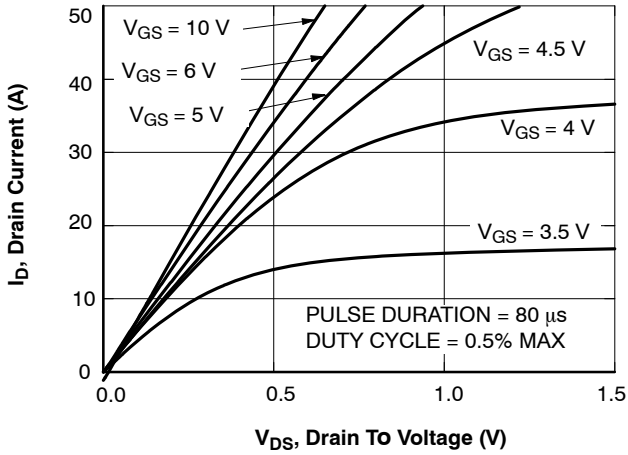


Figure 1. On-Region Characteristics

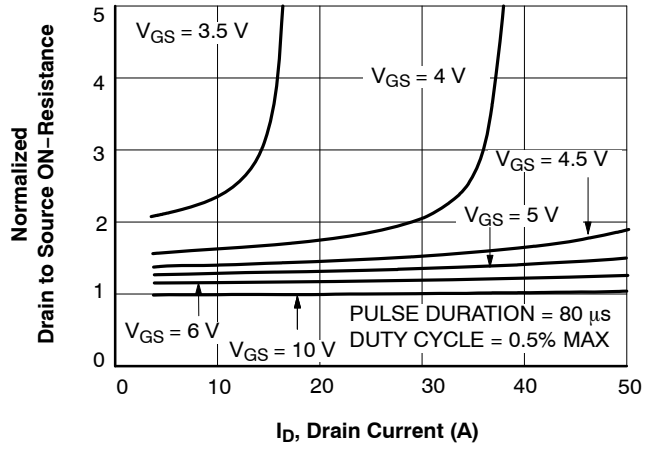


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

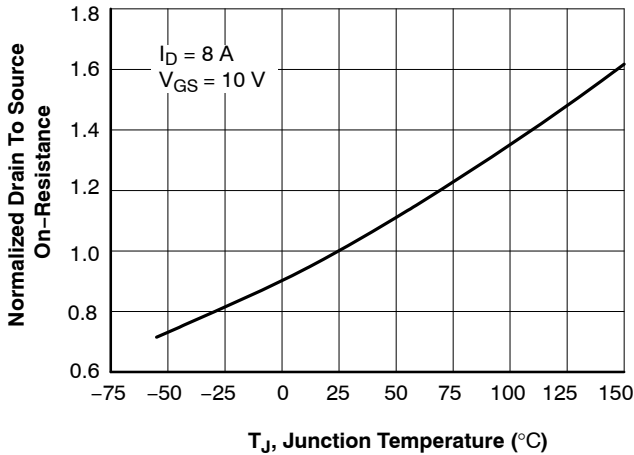


Figure 3. Normalized On-Resistance vs Junction Temperature

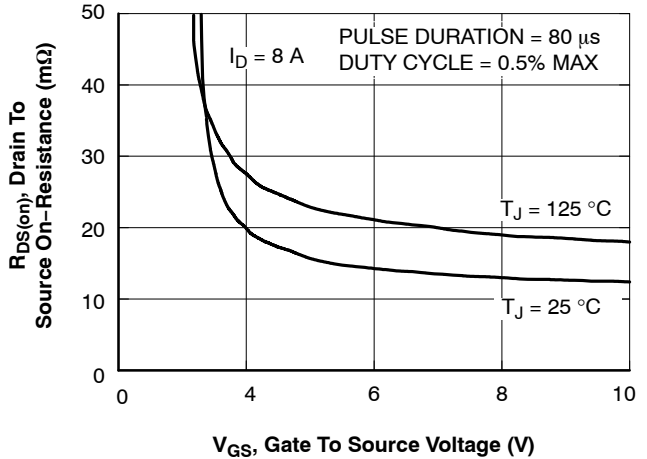


Figure 4. On-Resistance vs Gate to Source Voltage

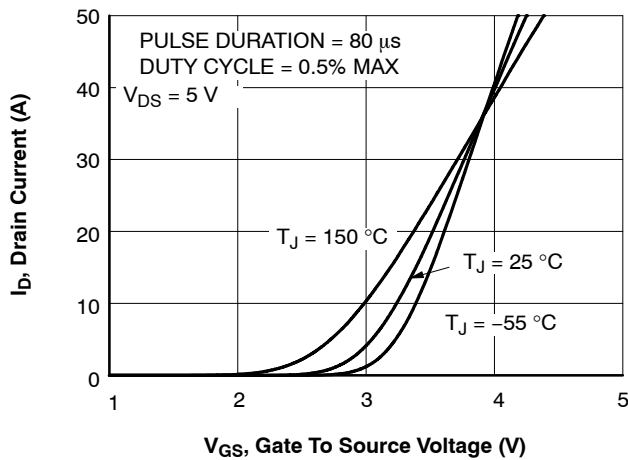


Figure 5. Transfer Characteristics

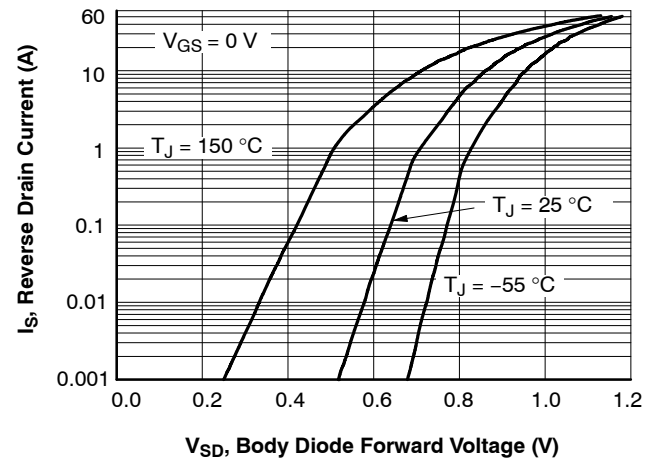


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

TYPICAL CHARACTERISTICS (continued)

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

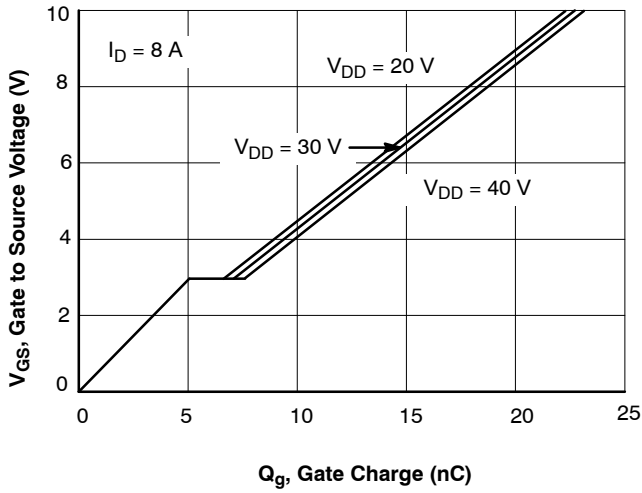


Figure 7. Gate Charge Characteristics

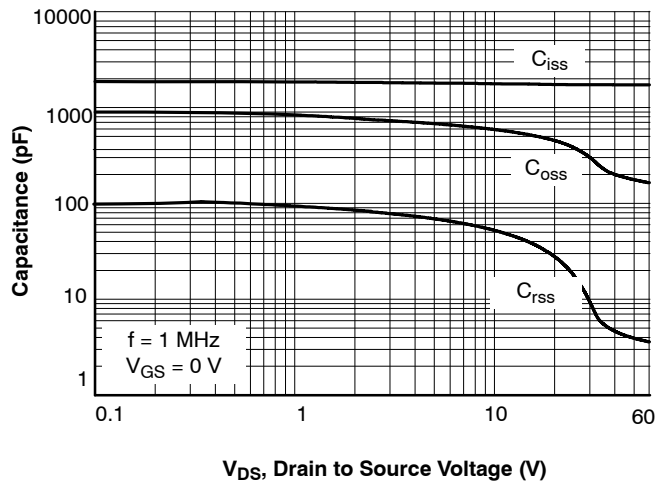


Figure 8. Capacitance vs Drain to Source Voltage

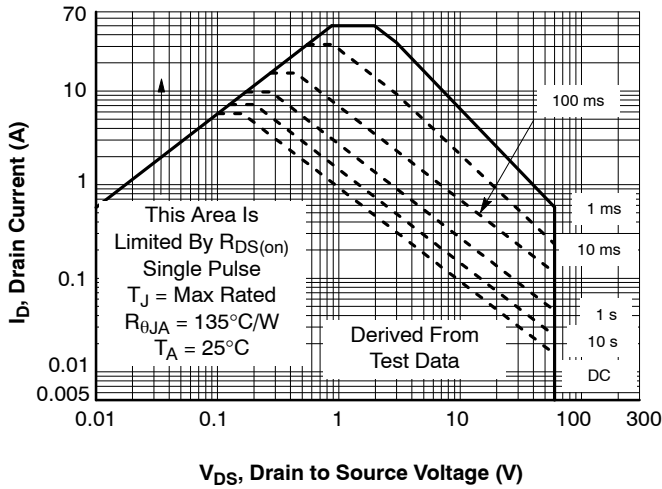


Figure 9. Forward Bias Safe Operating Area

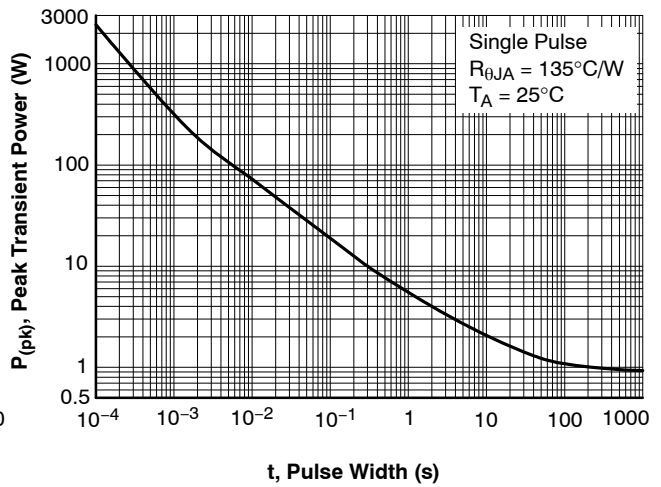


Figure 10. Single Pulse Maximum Power Dissipation

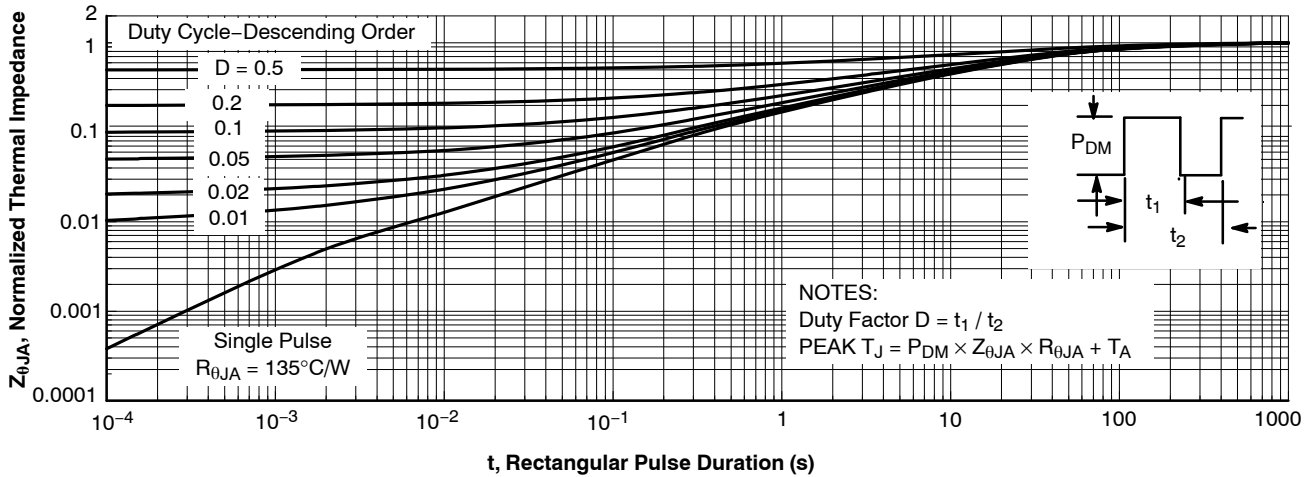


Figure 11. Junction-to-Ambient Transient Thermal Response Curve

MECHANICAL CASE OUTLINE

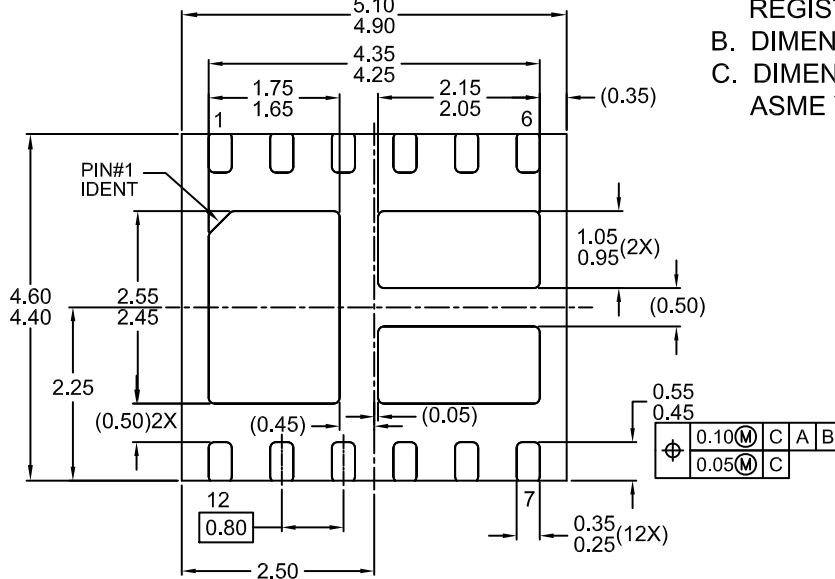
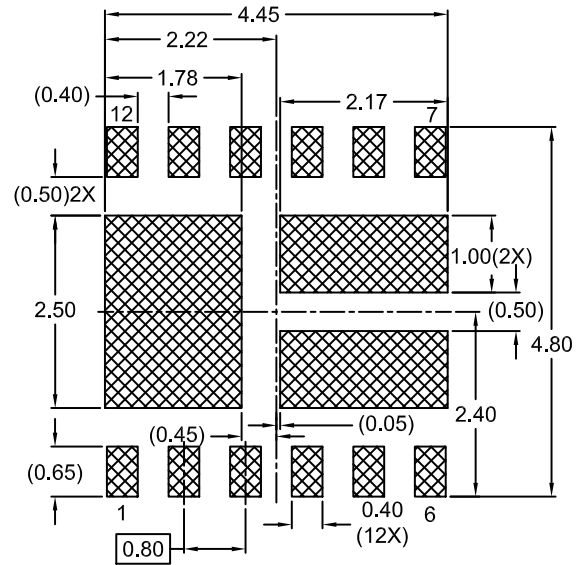
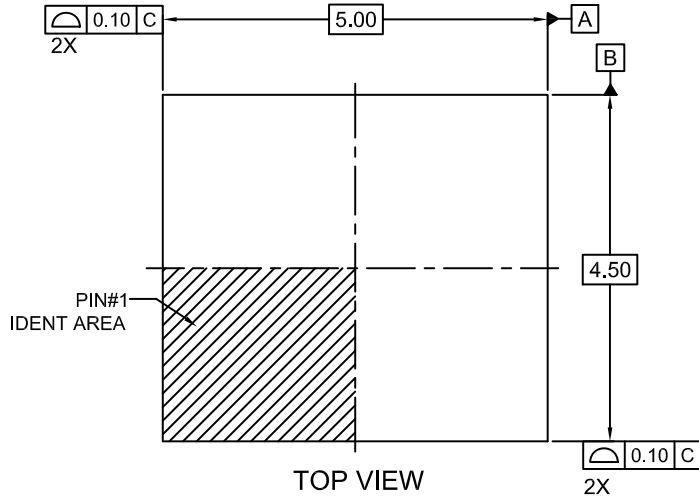
PACKAGE DIMENSIONS

ON Semiconductor®



WDFN12 5x4.5, 0.8P
CASE 511CR
ISSUE A

DATE 21 MAR 2017



- NOTES:**
- A. THIS MKT. DWG. DOES NOT FULLY CONFORM TO JEDEC MO-229 REGISTRATION
 - B. DIMENSIONS ARE IN MILLIMETERS.
 - C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.

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