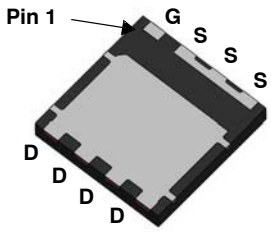
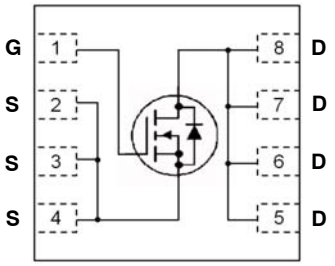
MOSFET – N-Channel DUAL COOL® 88 POWERTRENCH®

80 V, 254 A, 1.35 mΩ

FDMT80080DC



PQFN8 8X8, 2P
CASE 483AQ



Description

This N−Channel MOSFET is produced using **onsemi**'s advanced POWERTRENCH process. Advancements in both silicon and DUAL COOL package technologies have been combined to offer the lowest $R_{DS(on)}$ while maintaining excellent switching performance by extremely low Junction−to−Ambient thermal resistance.

Features

- Max $R_{DS(on)}$ = 1.35 m Ω at V_{GS} = 10 V, I_D = 36 A
- Max $R_{DS(on)}$ = 1.82 m Ω at V_{GS} = 8 V, I_D = 31 A
- Advanced Package and Silicon Combination for Low $R_{DS(on)}$ and High Efficiency
- Next Generation Enhanced Body diode technology, Engineered for Soft recovery
- Low profile 8x8mm MLP package
- MSL1 Robust Package Design
- 100% UIL tested
- These Device is Pb−Free, Halide Free, and is RoHS Compliant

Typical Applications

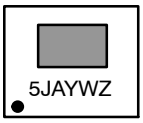
- OringFET / Load Switching
- Synchronous Rectification
- DC−DC Conversion

MOSFET MAXIMUM RATINGS T_A = 25°C unless otherwise noted

Symbol	Parameter	Value	Unit
V_{DS}	Drain to Source Voltage	80	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current – Continuous T_C = 25°C (Note 5) – Continuous T_C = 100°C (Note 5) – Continuous T_A = 25°C (Note 1) – Pulsed (Note 4)	 254 160 36 1453	A
E_{AS}	Single Pulse Avalanche Energy (Note 3)	1734	mJ
P_D	Power Dissipation T_C = 25°C	156	W
	Power Dissipation T_A = 25°C (Note 1)	3.2	
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.

MARKING DIAGRAM



5J = Specific Device Code
A = Assembly Plant Code
YW = Data Code (Year & Week)
Z = Lot Code

ORDERING INFORMATION

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

ELECTRICAL CHARACTERISTICS T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	80	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	41	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 64 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	2.0	3.1	4.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	−12	–	mV/°C
$R_{DS(on)}$	Static Drain−Source On−Resistance	V_{GS} = 10 V, I_D = 36 A V_{GS} = 8 V, I_D = 31 A, V_{GS} = 10 V, I_D = 36 A, T_J = 125°C	– – –	1.06 1.23 1.74	1.35 1.82 2.22	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 36 A	–	116	–	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 40 V, V_{GS} = 0 V, f = 1 MHz	–	14800	20720	pF
C_{oss}	Output Capacitance		–	2080	2915	pF
C_{rss}	Reverse Transfer Capacitance		–	56	125	pF
R_g	Gate Resistance		0.1	1.8	4.5	Ω
Switching Characteristics						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 40 V, I_D = 36 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	67	108	ns
t_r	Rise Time		–	65	104	ns
$t_{d(off)}$	Turn−Off Delay Time		–	75	120	ns
t_f	Fall Time		–	30	48	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V, to 10 V, V_{DD} = 40 V, I_D = 36 A	–	195	273	nC
	Total Gate Charge	V_{GS} = 0 V, to 8 V, V_{DD} = 40 V, I_D = 36 A	–	159	223	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 40 V, I_D = 36 A	–	69	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	36	–	nC
Drain−Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.6 A (Note 2)	–	0.7	1.1	V
		V_{GS} = 0 V, I_S = 36 A (Note 2)	–	0.8	1.2	
t_{rr}	Reverse Recovery Time	I_F = 36 A, di/dt = 100 A/μs	–	81	130	ns
Q_{rr}	Reverse Recovery Charge		–	88	141	nC

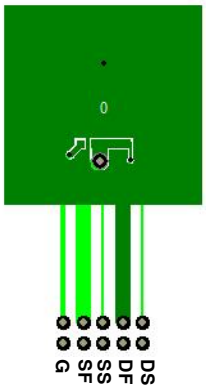
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case (Top Source)	1.6	°C/W
	Thermal Resistance, Junction−to−Case (Bottom Drain)	0.8	
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 1a)	38	
	Thermal Resistance, Junction−to−Ambient (Note 1b)	81	
	Thermal Resistance, Junction−to−Ambient (Note 1c)	26	
	Thermal Resistance, Junction−to−Ambient (Note 1d)	34	
	Thermal Resistance, Junction−to−Ambient (Note 1e)	14	
	Thermal Resistance, Junction−to−Ambient (Note 1f)	16	
	Thermal Resistance, Junction−to−Ambient (Note 1g)	26	
	Thermal Resistance, Junction−to−Ambient (Note 1h)	60	
	Thermal Resistance, Junction−to−Ambient (Note 1i)	15	
	Thermal Resistance, Junction−to−Ambient (Note 1j)	21	
	Thermal Resistance, Junction−to−Ambient (Note 1k)	9	
	Thermal Resistance, Junction−to−Ambient (Note 1 l)	11	

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a FR−4 board using a specified pad of 2 oz copper as shown below. $R_{\theta CA}$ is determined by the user's board design.



a) 38 °C/W when mounted on a 1 in^2 pad of 2 oz copper.

b) 81 °C/W when mounted on a minimum pad of 2 oz copper.

c) Still air, 20.9 x 10.4 x 12.7 mm Aluminum Heat Sink, 1 in^2 pad of 2 oz copper

d) Still air, 20.9 x 10.4 x 12.7 mm Aluminum Heat Sink, minimum pad of 2 oz copper

e) Still air, 45.2 x 41.4 x 11.7 mm Aavid Thermalloy Part # 10−L41B−11 Heat Sink, 1 in^2 pad of 2 oz copper

f) Still air, 45.2 x 41.4 x 11.7 mm Aavid Thermalloy Part # 10−L41B−11 Heat Sink, minimum pad of 2 oz copper

g) 200FPM Airflow, No Heat Sink,1 in^2 pad of 2 oz copper

h) 200FPM Airflow, No Heat Sink, minimum pad of 2 oz copper

i) 200FPM Airflow, 20.9 x 10.4 x 12.7 mm Aluminum Heat Sink, 1 in^2 pad of 2 oz copper

j) 200FPM Airflow, 20.9 x 10.4 x 12.7 mm Aluminum Heat Sink, minimum pad of 2 oz copper

k) 200FPM Airflow, 45.2 x 41.4 x 11.7 mm Aavid Thermalloy Part # 10−L41B−11 Heat Sink, 1 in^2 pad of 2 oz copper

l) 200FPM Airflow, 45.2 x 41.4 x 11.7 mm Aavid Thermalloy Part # 10−L41B−11 Heat Sink, minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%.
3. E_{AS} of 1734 mJ is based on starting T_J = 25°C, L = 3 mH, I_{AS} = 34 A, V_{DD} = 80 V, V_{GS} =10 V. 100% test at L = 0.3 mH, I_{AS} = 75 A
4. Pulsed Id please refer to Figure 11 SOA graph for more details.
5. Computed Continuous Current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro−mechanical application board design.

TYPICAL CHARACTERISTICS T_J = 25°C UNLESS OTHERWISE NOTED

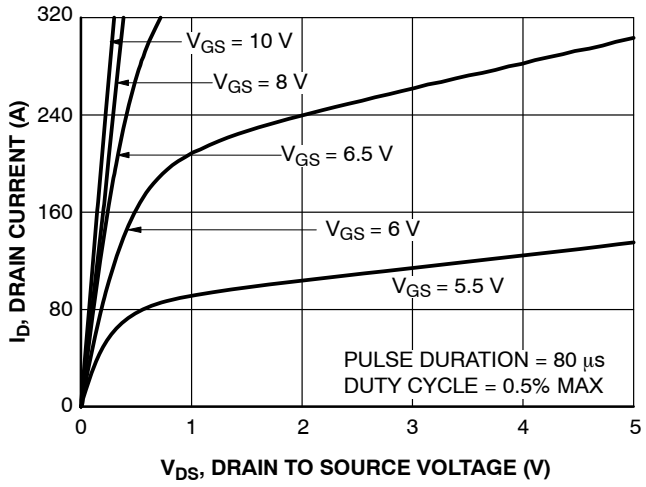


Figure 1. On−Region Characteristics

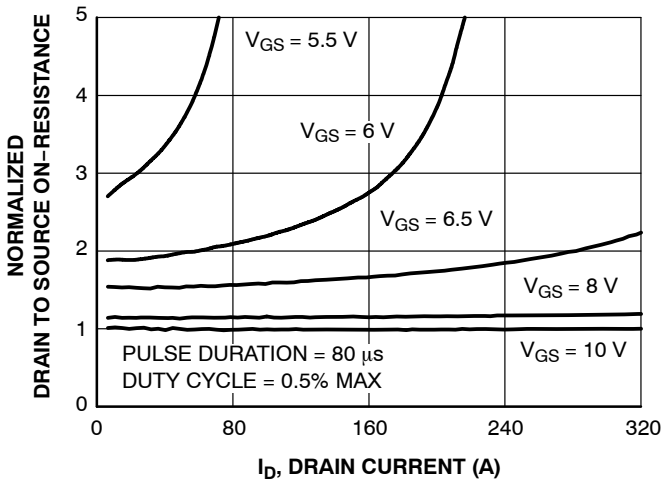


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

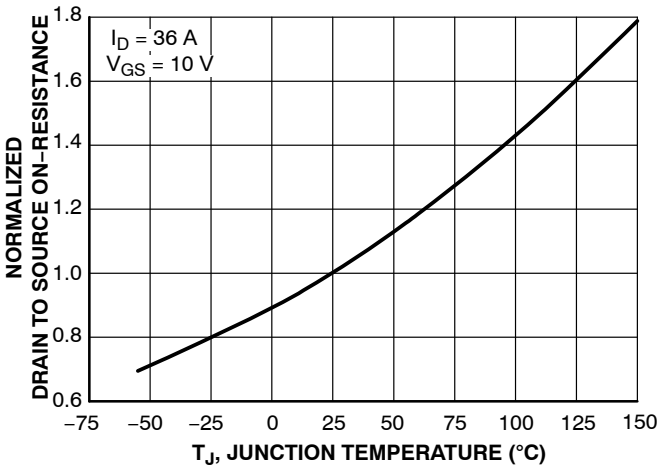


Figure 3. Normalized On Resistance vs. Junction Temperature

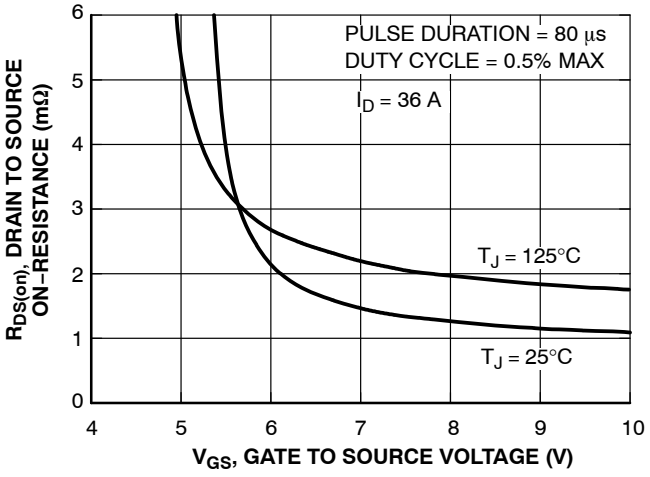


Figure 4. On Resistance vs. Gate to Source Voltage

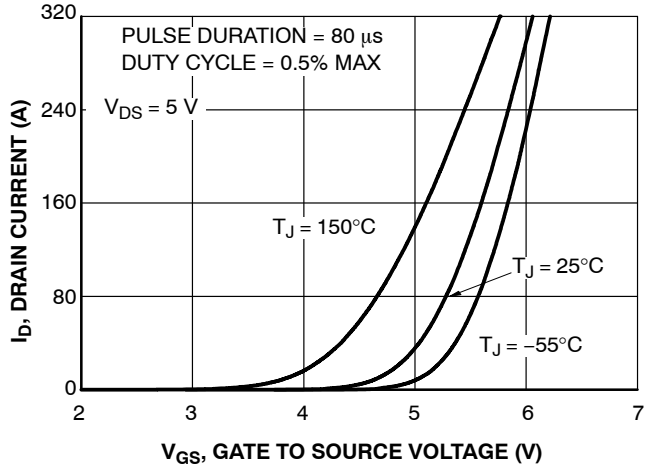


Figure 5. Transfer Characteristics

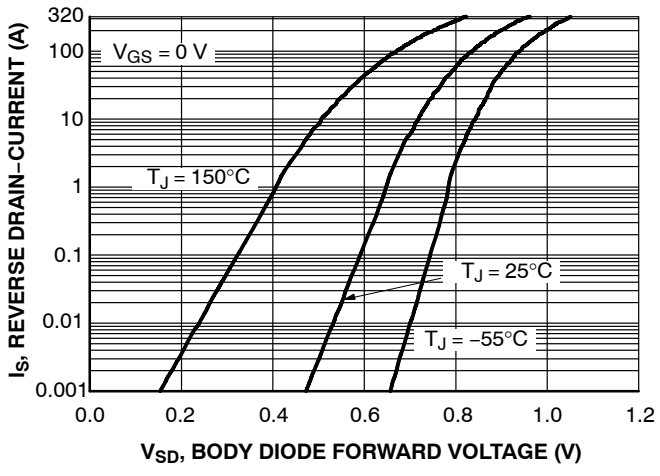


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (CONTINUED) T_J = 25°C UNLESS OTHERWISE NOTED

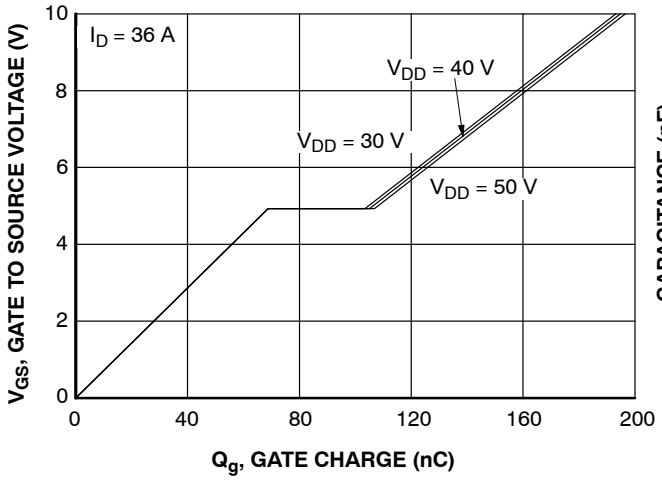


Figure 7. Gate Charge Characteristics

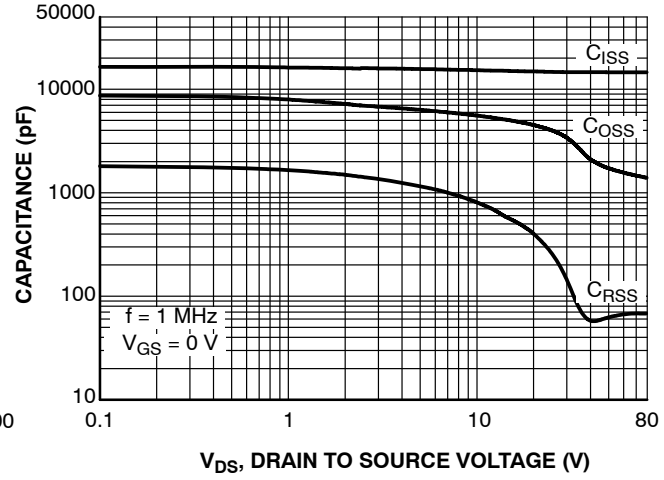


Figure 8. Capacitance vs. Drain to Source Voltage

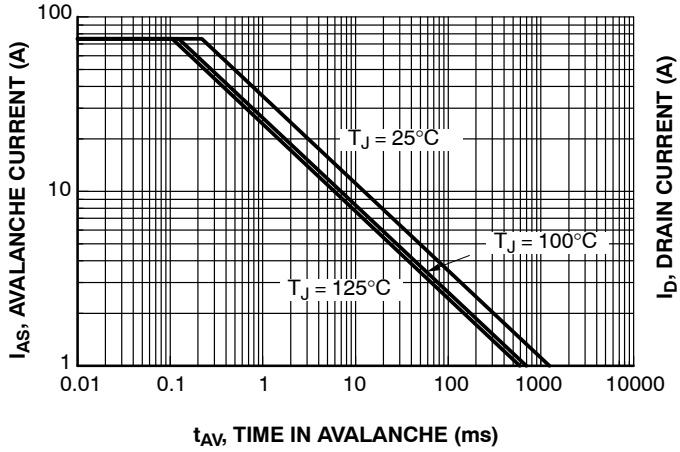


Figure 9. Unclamped Inductive Switching Capability

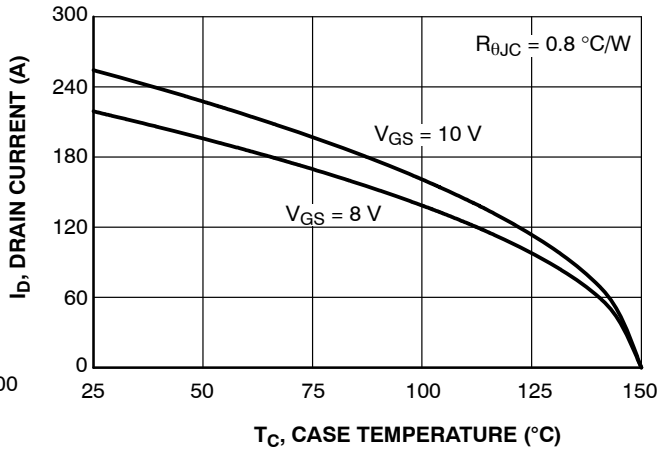


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

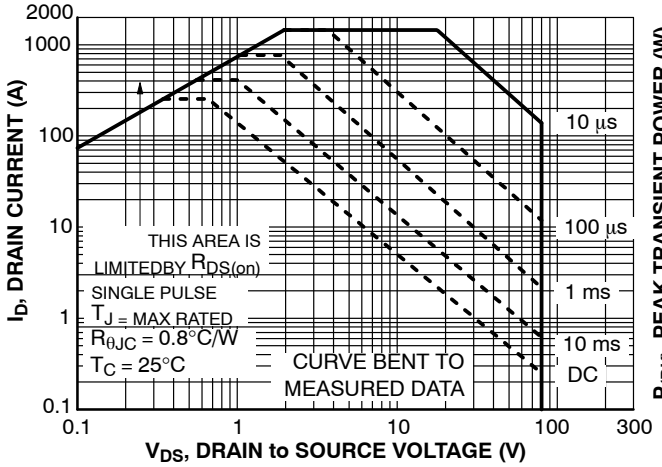


Figure 11. Forward Bias Safe Operating Area

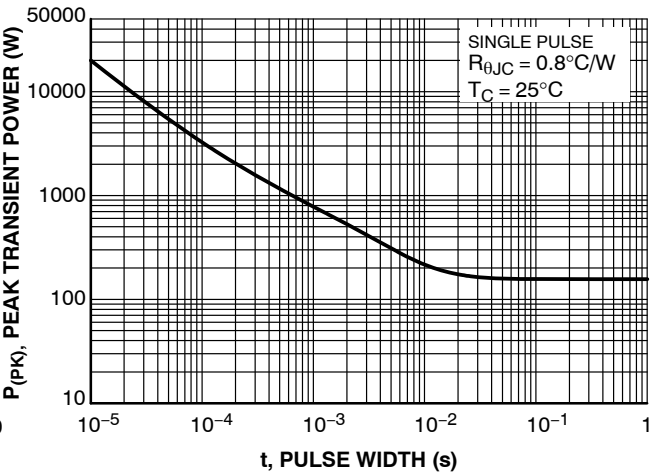


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (CONTINUED) T_J = 25°C UNLESS OTHERWISE NOTED

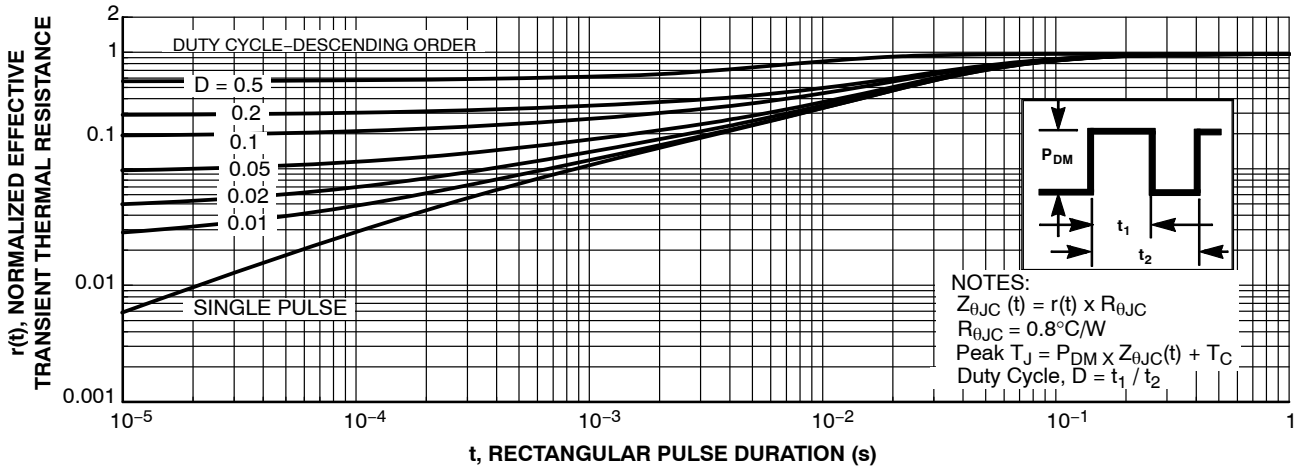
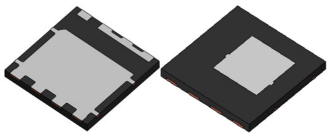


Figure 13. Junction−to−Case Transient Thermal Response Curve

ORDERING INFORMATION

Device Marking	Device	Package	Reel Size	Tape Width	Shipping (Qty / Packing)†
5J	FDMT80080DC	Dual Cool™88	13“	13.3 mm	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.



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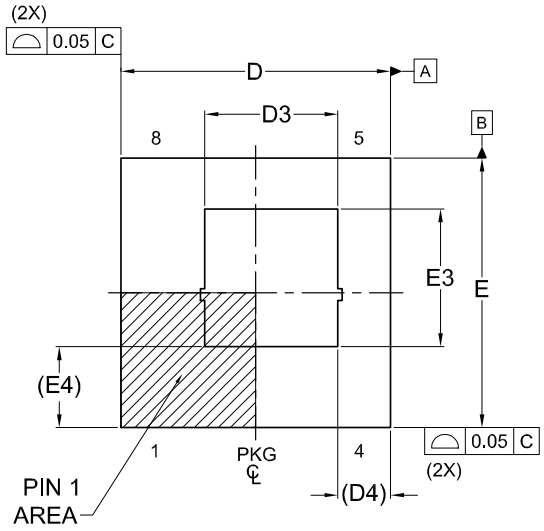
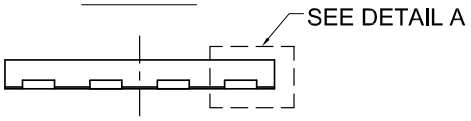
CASE 483AQ
ISSUE B

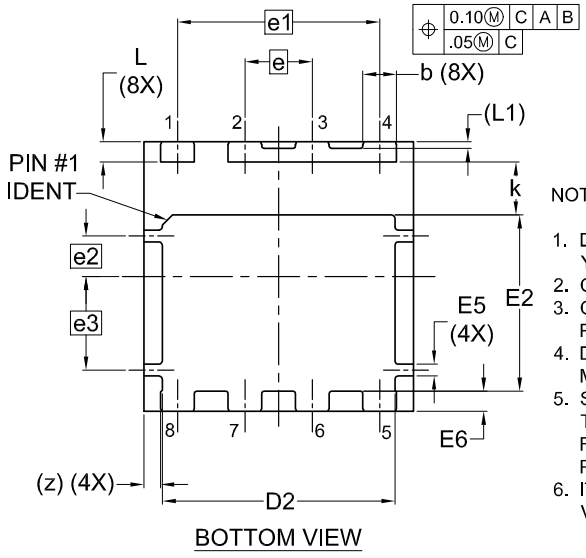
DATE 24 OCT 2022



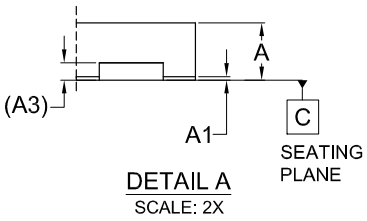
TOP VIEW



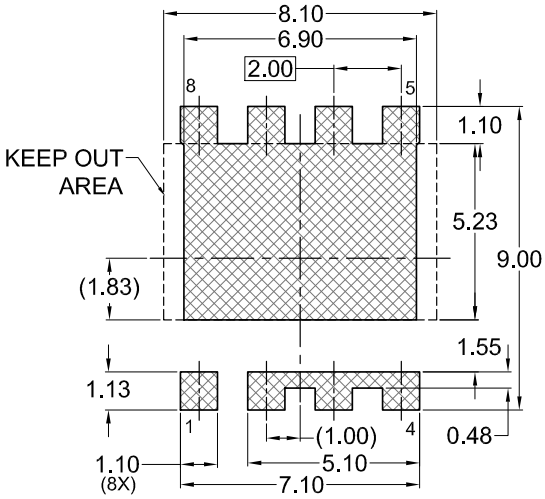
FRONT VIEW



BOTTOM VIEW



DETAIL A
SCALE: 2X



LAND PATTERN
RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
6. IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.75	0.85	0.95
A1	0.00	-	0.05
A3	0.25 REF		
b	0.90	1.00	1.10
D	7.90	8.00	8.10
D2	6.80	6.90	7.00
D3	3.68	3.86	4.03
D4	1.56 REF		
E	7.90	8.00	8.10
E2	5.13	5.23	5.33
E3	3.99	4.09	4.19
E4	2.41 REF		
E5	0.35 REF		
E6	0.60 REF		
e	2.00 BSC		
e1	6.00 BSC		
e2	1.20 BSC		
e3	2.78 BSC		
k	1.48	1.58	1.68
L	0.50	0.60	0.70
L1	0.20 REF		
z	0.50 REF		

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DESCRIPTION:	**PQFN8 8X8, 2P**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales