

MOSFET – N-Channel, POWERTRENCH®

80 V, 80 A, 4.5 mΩ

FDMS86368-F085

Features

- Typical $R_{DS(on)}$ = 3.7 mΩ at V_{GS} = 10 V, I_D = 80 A
- Typical $Q_{g(tot)}$ = 57 nC at V_{GS} = 10 V, I_D = 80 A
- UIS Capability
- AEC-Q101 Qualified
- These Devices are Pb-Free and are RoHS Compliant

Applications

- Automotive Engine Control
- PowerTrain Management
- Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12 V Systems

MOSFET MAXIMUM RATINGS (T_J = 25°C, Unless otherwise specified)

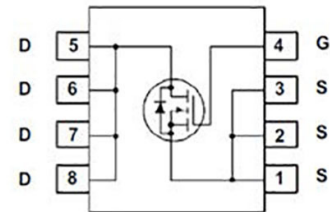
Symbol	Parameter	Ratings	Unit
V_{DSS}	Drain to Source Voltage	80	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current (T_C = 25°C) Continuous (V_{GS} = 10 V) (Note 1) Pulsed	80 (see Fig. 124)	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	82	mJ
P_D	Power Dissipation Derate above 25°C	214 1.43	W W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to +175	°C
$R_{\theta JC}$	Thermal Resistance (Junction to case)	0.7	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance (Junction to Ambient) (Note 3)	50	°C/W

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.

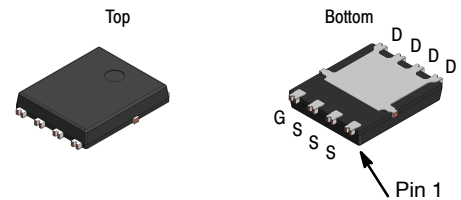
1. Current is limited by bondwire configuration.
2. Starting T_J = 25°C, L = 40 μH, I_{AS} = 64 A, V_{DD} = 80 V during inductor charging and V_{DD} = 0 V during time in avalanche.
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2oz copper.

V_{DSS}	$R_{DS(on)}$ MAX	I_D MAX
80 V	4.5 mΩ @ 10 V	80 A

ELECTRICAL CONNECTION

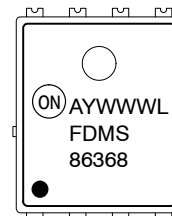


N-Channel MOSFET



DFNW8 CASE 507AU

MARKING DIAGRAM



- A = Assembly Location
- Y = Year
- WW = Work Week
- WL = Assembly Lot
- FDMS = Device Code
- 86368 = Device Code

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
FDMS86368-F085	DFNW8 (Power56) (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 Specification Brochure, BRD8011/D.

FDMS86368–F085

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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OFF CHARACTERISTICS

$B_{V_{DS}}$	Drain-to-Source Breakdown Voltage	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0\ \text{V}$	80			V
I_{DSS}	Drain-to-Source Leakage Current	$V_{DS} = 80\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_J = 25^\circ\text{C}$			1	μA
		$V_{DS} = 80\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_J = 175^\circ\text{C}$ (Note 4)			1	mA
I_{GSS}	Gate-to-Source Leakage Current	$V_{GS} = \pm 20\ \text{V}$			± 100	nA

ON CHARACTERISTICS

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\ \mu\text{A}$	2.0	3.0	4.0	V
$R_{DS(on)}$	Drain to Source On Resistance	$I_D = 80\ \text{A}$, $V_{GS} = 10\ \text{V}$, $T_J = 25^\circ\text{C}$		3.7	4.5	m Ω
		$I_D = 80\ \text{A}$, $V_{GS} = 10\ \text{V}$, $T_J = 175^\circ\text{C}$ (Note 4)		7.4	9.0	

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 40\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$		4350		pF
C_{oss}	Output Capacitance			636		
C_{rss}	Reverse Transfer Capacitance			20		
R_g	Gate Resistance	$f = 1\ \text{MHz}$		2.5		Ω
$Q_{g(ToT)}$	Total Gate Charge	$V_{GS} = 0\ \text{V}$ to $10\ \text{V}$	$V_{DD} = 64\ \text{V}$, $I_D = 80\ \text{A}$	57	75	nC
$Q_{g(th)}$	Threshold Gate Charge	$V_{GS} = 0\ \text{V}$ to $2\ \text{V}$		8		
Q_{gs}	Gate-to-Source Gate Charge			23		
Q_{gd}	Gate-to-Drain "Miller" Charge			11		

SWITCHING CHARACTERISTICS

t_{on}	Turn-On Time	$V_{DD} = 40\ \text{V}$, $I_D = 80\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_{GEN} = 6\ \Omega$			60	ns
$t_{d(on)}$	Turn-On Delay			23		
t_r	Rise Time			22		
$t_{d(off)}$	Turn-Off Delay			32		
t_f	Fall Time			13		
t_{off}	Turn-Off Time				59	

DRAIN-SOURCE DIODE CHARACTERISTICS

V_{SD}	Source-to-Drain Diode Voltage	$I_{SD} = 80\ \text{A}$, $V_{GS} = 0\ \text{V}$ $I_{SD} = 40\ \text{A}$, $V_{GS} = 0\ \text{V}$			1.25 1.2	V
t_{rr}	Reverse-Recovery Time	$I_F = 80\ \text{A}$, $\Delta I_{SD}/\Delta t = 100\ \text{A}/\mu\text{s}$, $V_{DD} = 64\ \text{V}$		58	75	ns
Q_{rr}	Reverse-Recovery Charge			49	67	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.

NOTE:

4. The maximum value is specified by design at $T_J = 175^\circ\text{C}$. Product is not tested to this condition in production.

TYPICAL CHARACTERISTICS

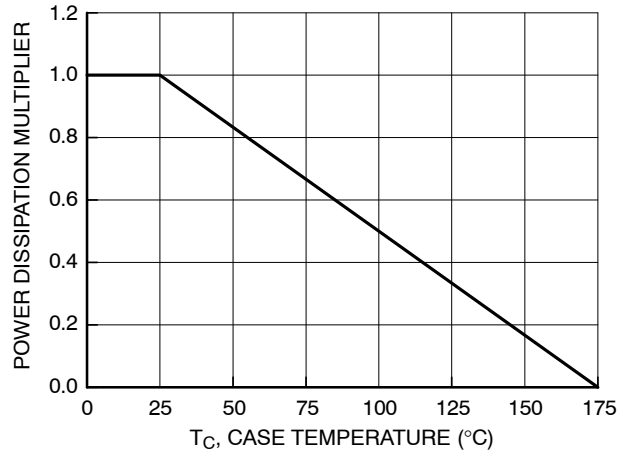


Figure 1. Normalized Power Dissipation vs. Case Temperature

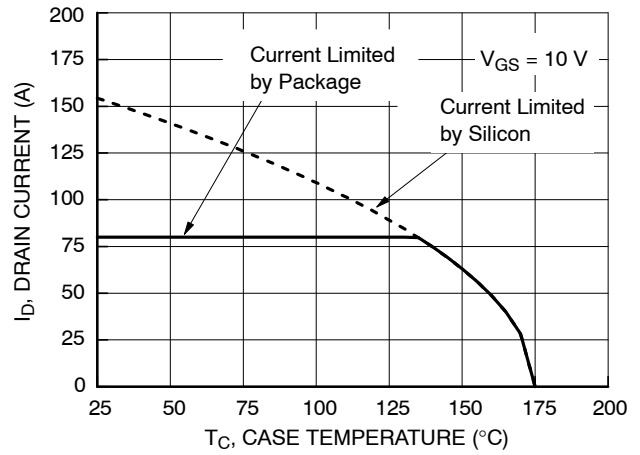


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

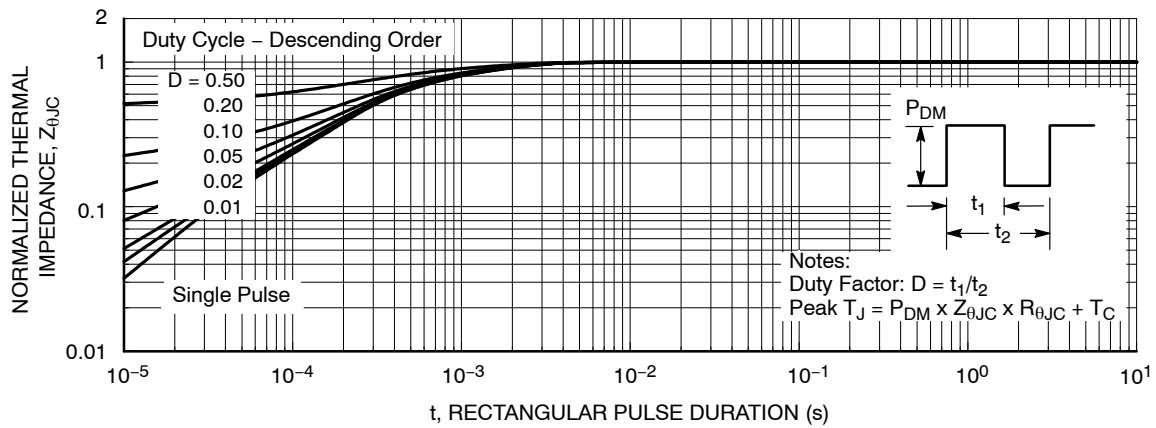


Figure 3. Normalized Maximum Transient Thermal Impedance

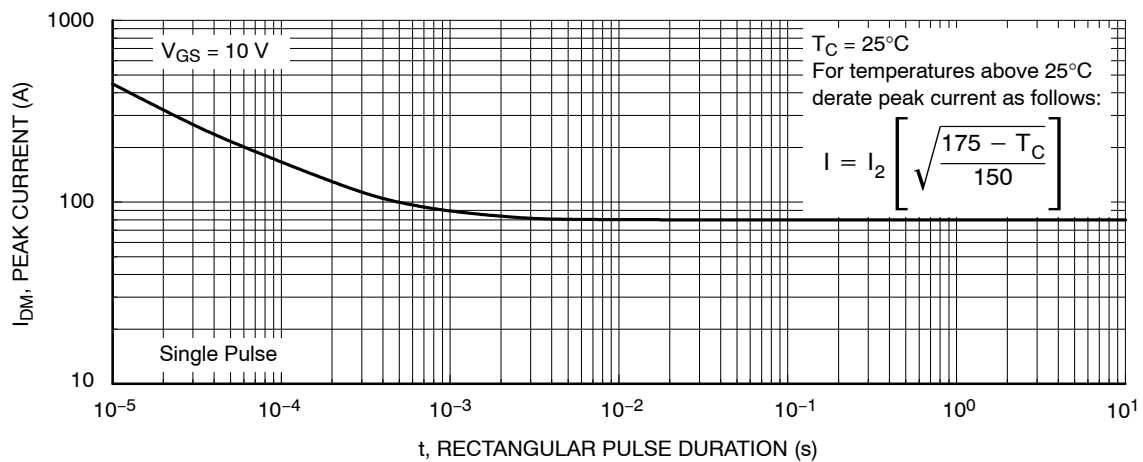


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS

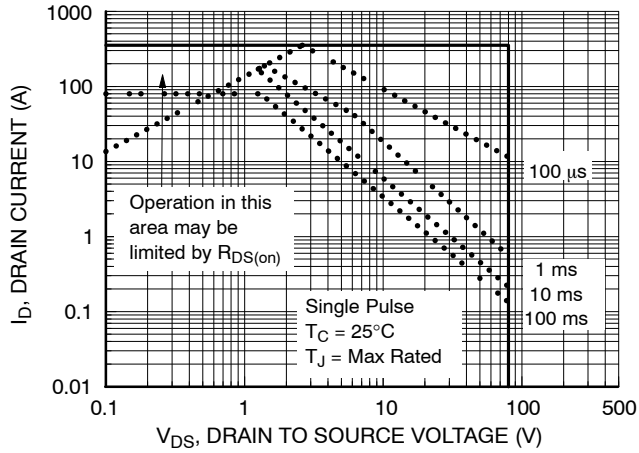


Figure 5. Forward Bias Safe Operating Area

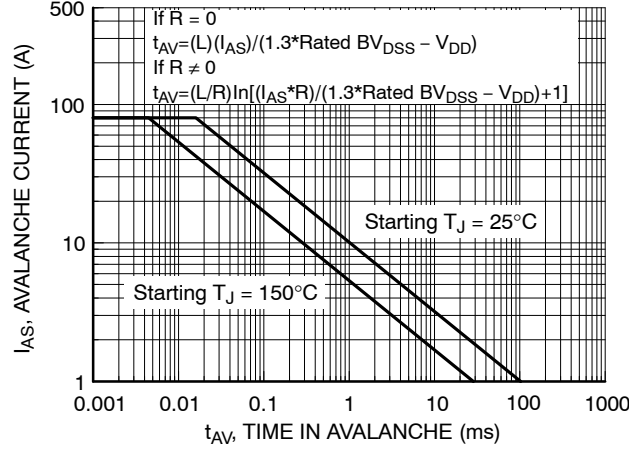
NOTE: Refer to **onsemi** Application Notes[AN7514](#) and [AN7515](#)

Figure 6. Unclamped Inductive Switching Capability

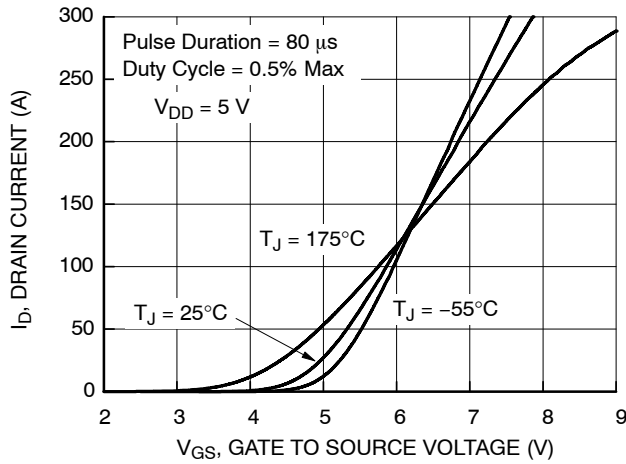


Figure 7. Transfer Characteristics

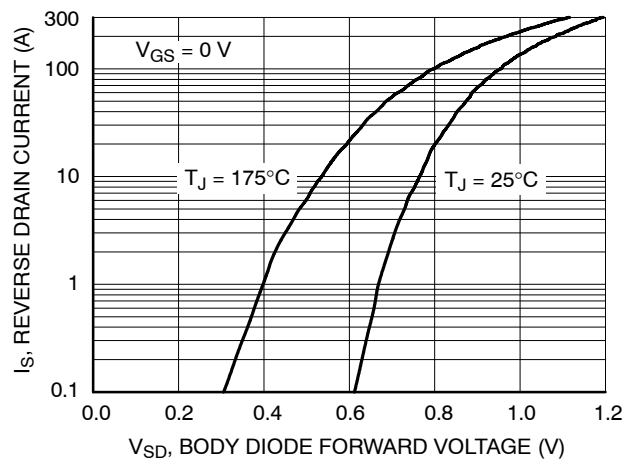


Figure 8. Forward Diode Characteristics

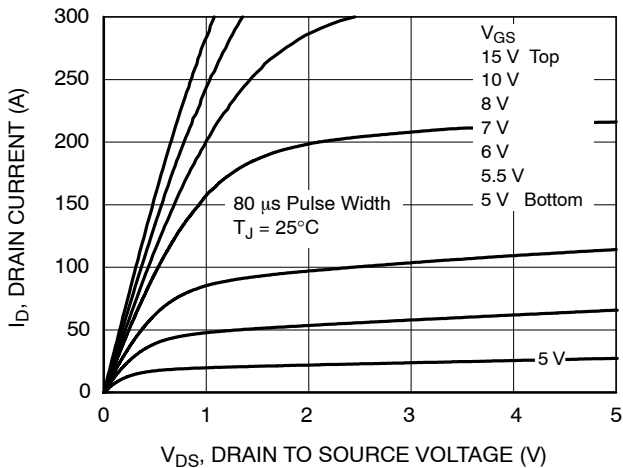


Figure 9. Saturation Characteristics

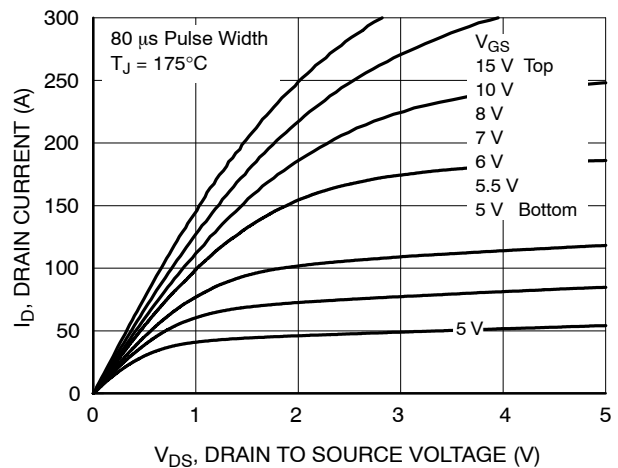


Figure 10. Saturation Characteristics

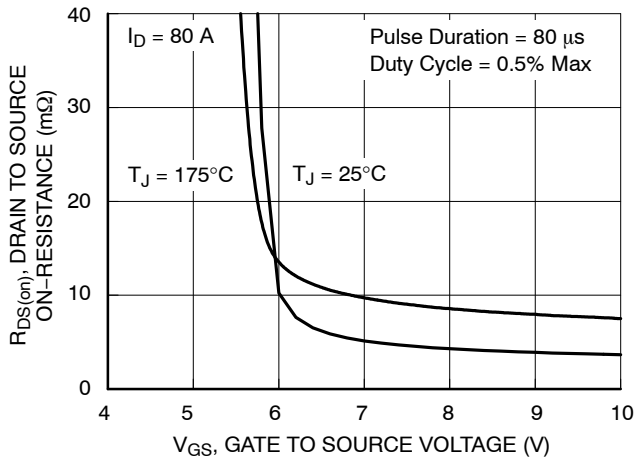


Figure 11. $R_{DS(on)}$ vs. Gate Voltage

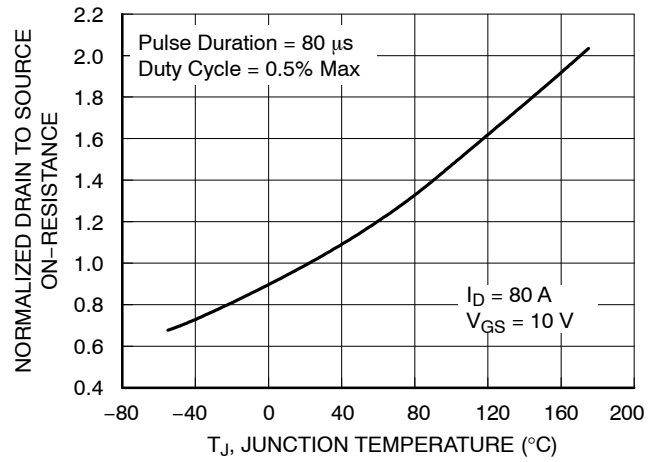


Figure 12. Normalized $R_{DS(on)}$ vs. Junction Temperature

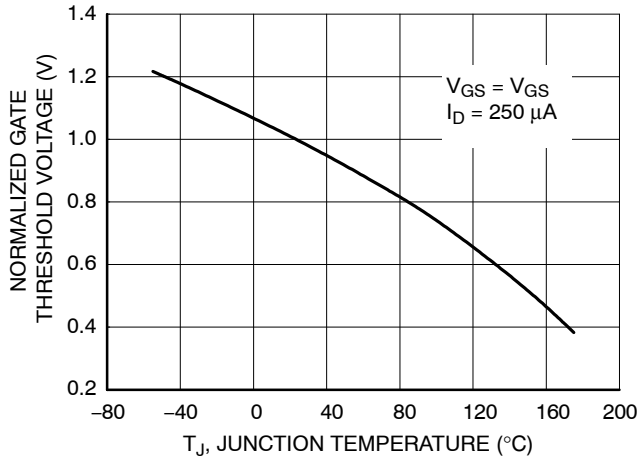


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

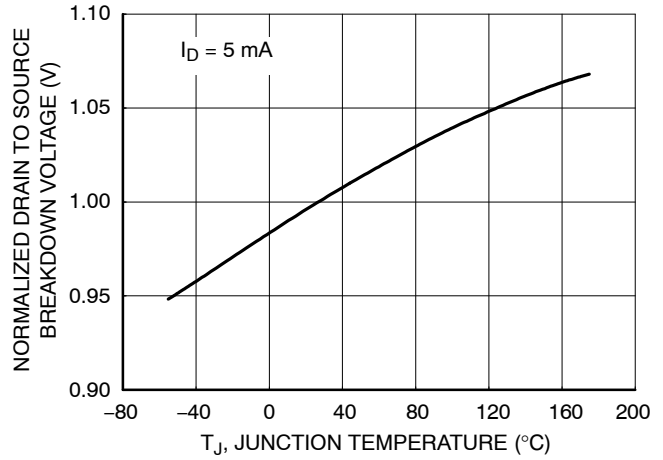


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

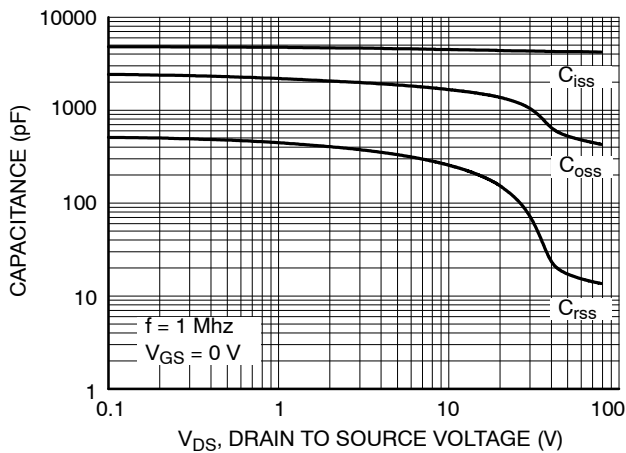


Figure 15. Capacitance vs. Drain to Source Voltage

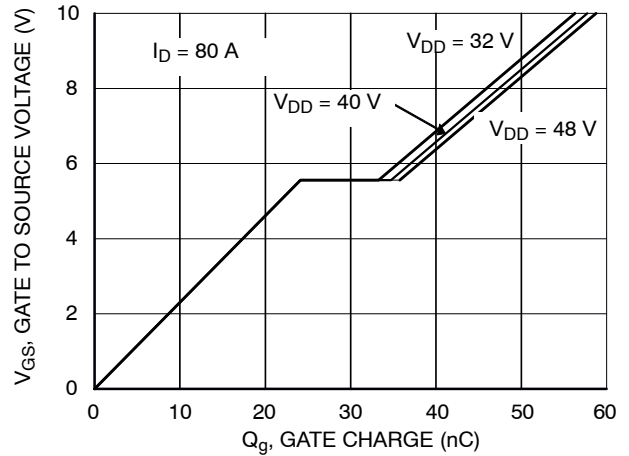
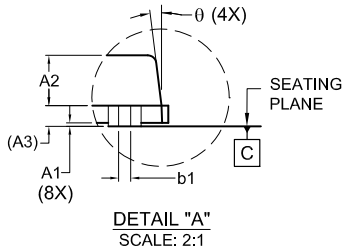
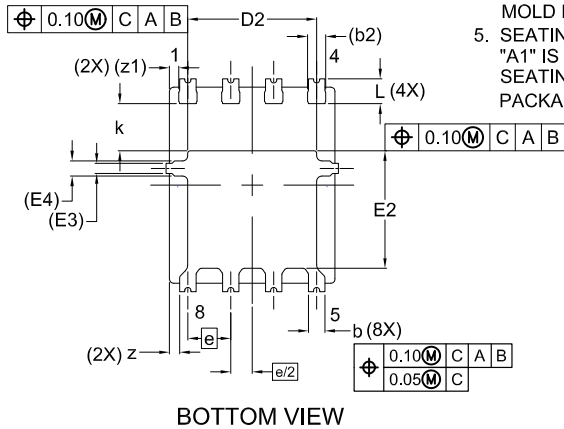
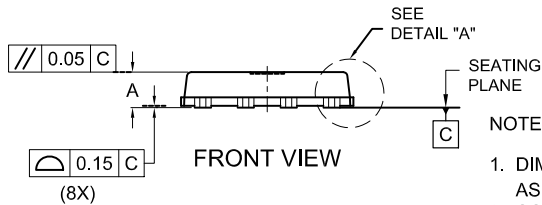
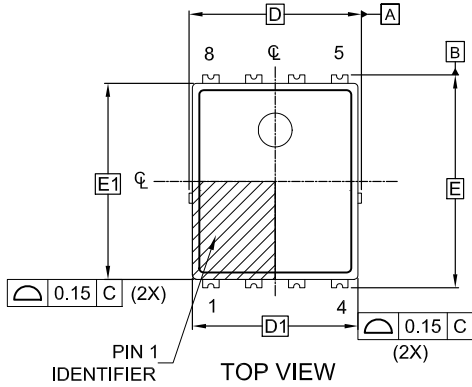


Figure 16. Gate Charge vs. Gate to Source Voltage

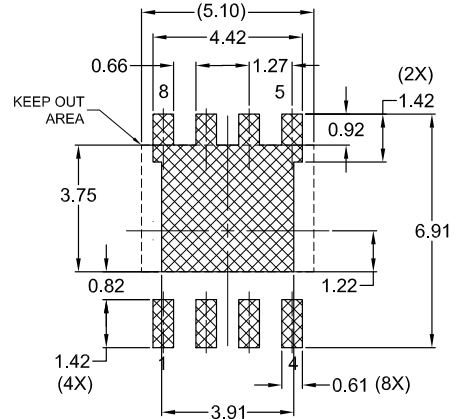
PACKAGE DIMENSIONS

DFNW8 5.2x6.3, 1.27P
CASE 507AU
ISSUE A



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.



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.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	-	-	0.05
A2	0.65	0.75	0.85
A3	0.30 REF		
b	0.47	0.52	0.57
b1	0.13	0.18	0.23
b2	(0.54)		
D	5.00	5.10	5.20
D1	4.80	4.90	5.00
D2	3.72	3.82	3.92
E	6.20	6.30	6.40
E1	5.70	5.80	5.90
E2	3.38	3.48	3.58
E3	0.30 REF		
E4	0.45 REF		
e	1.27 BSC		
e/2	0.635BSC		
k	1.30	1.40	1.50
L	0.64	0.74	0.84
z	0.24	0.29	0.34
z1	(0.28)		
θ	0°	---	12°

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