

**MOSFET – N-Channel,
Shielded Gate,
POWERTRENCH®****100 V, 43 A, 14 mΩ****FDMC86160ET100****General Description**

This N-Channel MOSFET is produced using onsemi's advanced POWERTRENCH process that incorporates Shielded Gate technology. This process has been optimized for the on-state resistance. This device is well suited for applications where ultra low $R_{DS(on)}$ is required in small spaces such as High performance VRM, POL and orring functions.

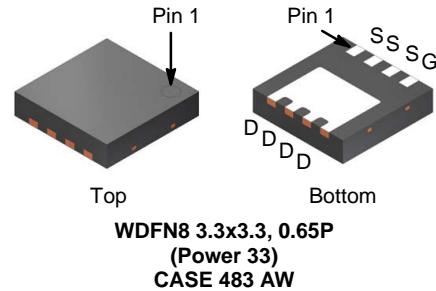
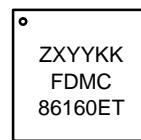
Features

- Extended T_J Rating to 175°C
- Shielded Gate MOSFET Technology
- Max $r_{DS(on)} = 14 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 9 \text{ A}$
- Max $r_{DS(on)} = 23 \text{ m}\Omega$ at $V_{GS} = 6 \text{ V}$, $I_D = 7 \text{ A}$
- High Performance Technology for Extremely Low $r_{DS(on)}$
- Termination is Lead-free and RoHS Compliant

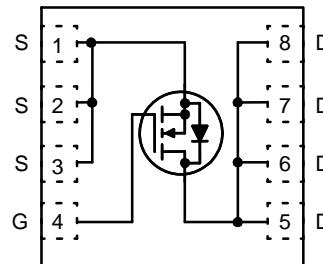
Applications

- Bridge Topologies
- Synchronous Rectifier

V_{DS}	$r_{DS(on)}$ MAX	I_D MAX
100 V	14 mΩ @ 10 V	43 A
	23 mΩ @ 6 V	

**MARKING DIAGRAM**

Z = Assembly Plant Code
 XYY = 3-Digit Date Code Format
 KK = 2-Alphanumeric Lot Run
 Traceability Code
 FDMC86160ET = Device Code

PIN ASSIGNMENT**ORDERING INFORMATION**

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

FDMC86160ET100

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

Symbol	Parameter			Ratings	Unit
V_{DS}	Drain to Source Voltage			100	V
V_{GS}	Gate to Source Voltage			± 20	V
I_D	Drain Current – Continuous	$T_C = 25^\circ\text{C}$	(Note 5)	43	A
	– Continuous	$T_C = 100^\circ\text{C}$	(Note 5)	31	
	– Continuous	$T_A = 25^\circ\text{C}$	(Note 1a)	9	A
	– Pulsed		(Note 4)	204	A
E_{AS}	Single Pulse Avalanche Energy			(Note 3)	181 mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$		65	W
	Power Dissipation	$T_A = 25^\circ\text{C}$	(Note 1a)	2.8	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			–55 to +175	$^\circ\text{C}$

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
$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Note 1)	2.3 $^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	53

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	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	100	–	–	V
$\frac{\Delta V_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C	–	73	–	$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 80 \text{ V}, V_{GS} = 0 \text{ V}$	–	–	1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$	–	–	± 100	nA

ON CHARACTERISTICS

$V_{GS(\text{th})}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	2	2.9	4	V
$\frac{\Delta V_{GS(\text{th})}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C	–	–9	–	$\text{mV}/^\circ\text{C}$
$r_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 9 \text{ A}$	–	11.2	14	$\text{m}\Omega$
		$V_{GS} = 6 \text{ V}, I_D = 7 \text{ A}$	–	16	23	
		$V_{GS} = 10 \text{ V}, I_D = 9 \text{ A}, T_J = 125^\circ\text{C}$	–	21	26	
g_{FS}	Forward Transconductance	$V_{DD} = 10 \text{ V}, I_D = 9 \text{ A}$	–	43	–	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 50 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	–	968	1290	pF
C_{oss}	Output Capacitance		–	241	320	pF
C_{rss}	Reverse Transfer Capacitance		–	11	20	pF
R_g	Gate Resistance		0.1	0.6	2.5	Ω

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50 \text{ V}, I_D = 9 \text{ A}, V_{GS} = 10 \text{ V}, R_{\text{GEN}} = 6 \Omega$	–	9.7	19	ns
t_r	Rise Time		–	3.6	10	ns
$t_{d(off)}$	Turn-Off Delay Time		–	16	30	ns
t_f	Fall Time		–	3.4	10	ns

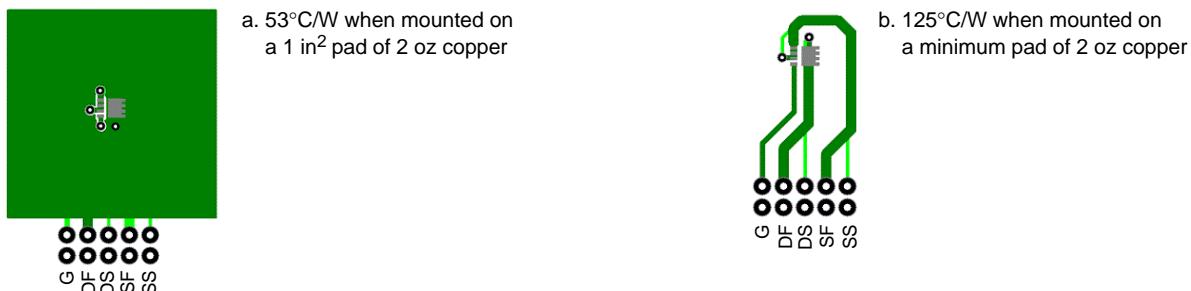
FDMC86160ET100

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS						
$Q_{g(\text{TOT})}$	Total Gate Charge	$V_{GS} = 0 \text{ V to } 10 \text{ V}$, $V_{DD} = 50 \text{ V}$, $I_D = 9 \text{ A}$	–	15	22	nC
$Q_{g(\text{TOT})}$	Total Gate Charge	$V_{GS} = 0 \text{ V to } 6 \text{ V}$, $V_{DD} = 50 \text{ V}$, $I_D = 9 \text{ A}$	–	9.8	15	nC
Q_{gs}	Total Gate Charge	$V_{DD} = 50 \text{ V}$, $I_D = 9 \text{ A}$	–	4.4	–	nC
Q_{gd}	Gate to Drain "Miller" Charge		–	3.5	–	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}$, $I_S = 9 \text{ A}$ (Note 2)	–	0.79	1.3	V
		$V_{GS} = 0 \text{ V}$, $I_S = 1.9 \text{ A}$ (Note 2)	–	0.72	1.2	
t_{rr}	Reverse Recovery Time	$I_F = 9 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$	–	47	75	ns
Q_{rr}	Reverse Recovery Charge		–	45	73	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.

1. $R_{\theta JA}$ 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. $R_{\theta CA}$ is determined by the user's board design.



2. Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.
3. E_{AS} of 181 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 3 \text{ mH}$, $I_{AS} = 11 \text{ A}$, $V_{DD} = 100 \text{ V}$, $V_{GS} = 10 \text{ V}$. 100% test at $L = 0.1 \text{ mH}$, $I_{AS} = 35 \text{ A}$.
4. Pulsed I_d 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 ($T_J = 25^\circ\text{C}$ unless otherwise noted)

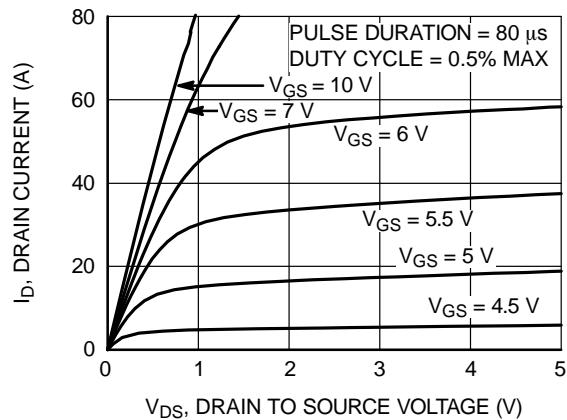


Figure 1. On-Region Characteristics

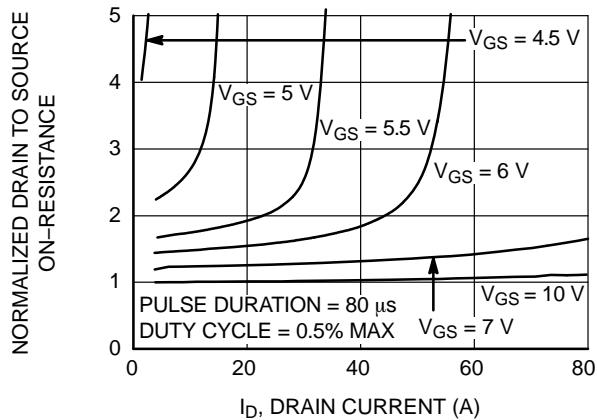


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

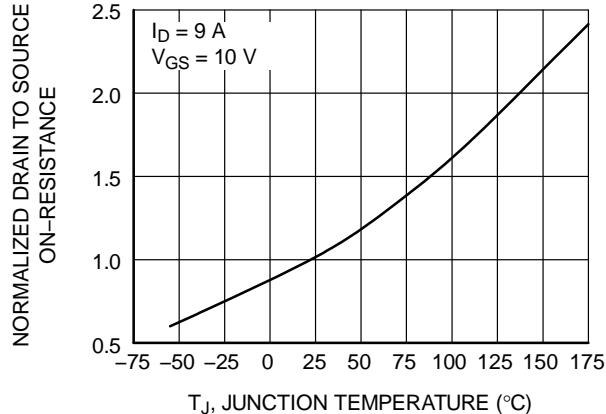


Figure 3. Normalized On-Resistance vs. Junction Temperature

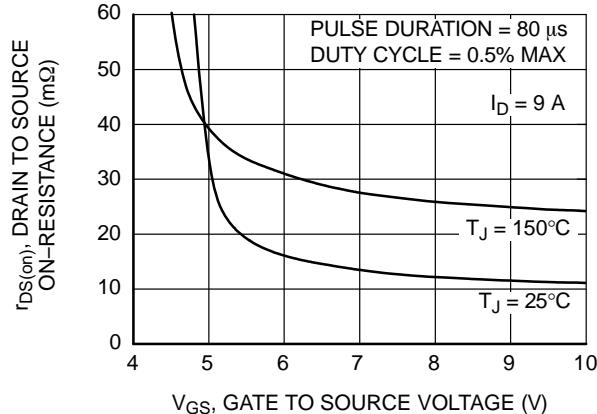


Figure 4. On-Resistance vs. Gate to Source Voltage

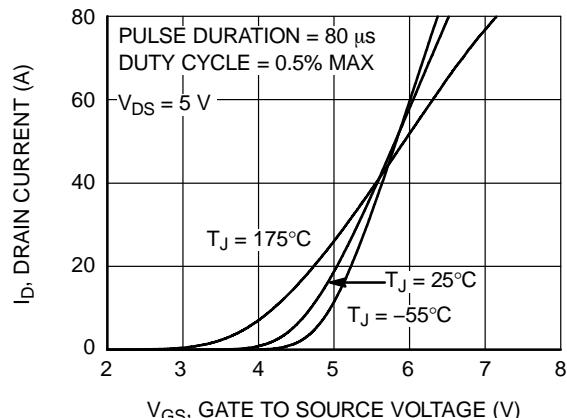


Figure 5. Transfer Characteristics

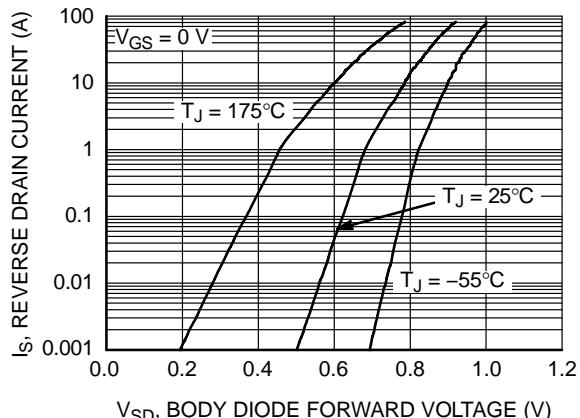


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

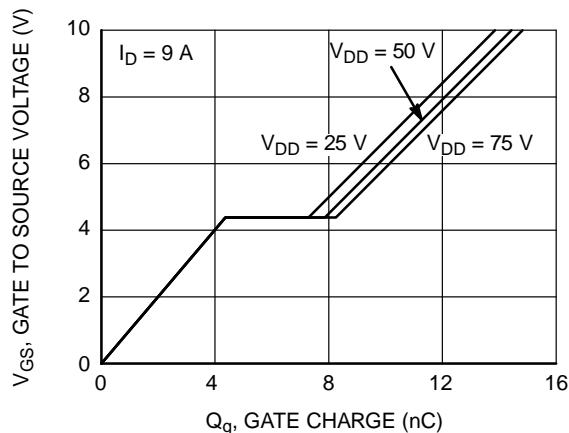


Figure 7. Gate Charge Characteristics

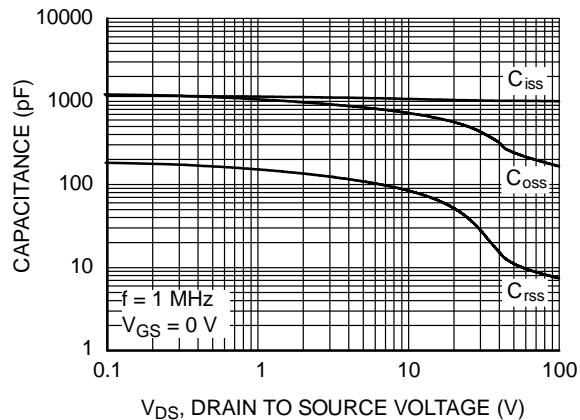


Figure 8. Capacitance vs. Drain to Source Voltage

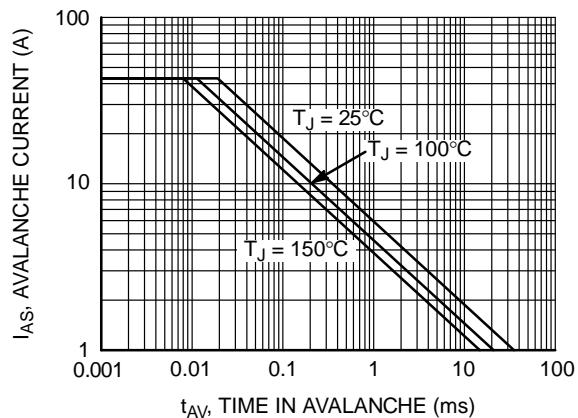


Figure 9. Unclamped Inductive Switching Capability

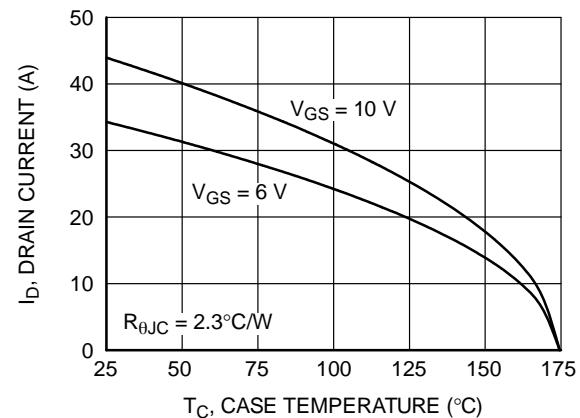


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

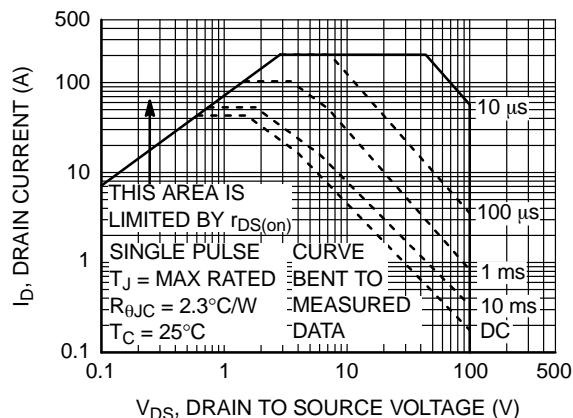


Figure 11. Forward Bias Safe Operating Area

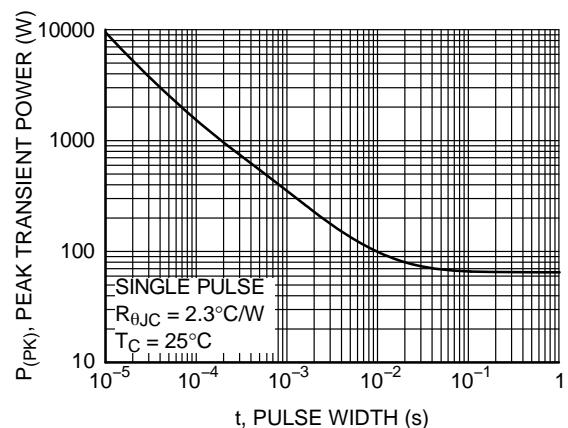


Figure 12. Single Pulse Maximum Power Dissipation

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

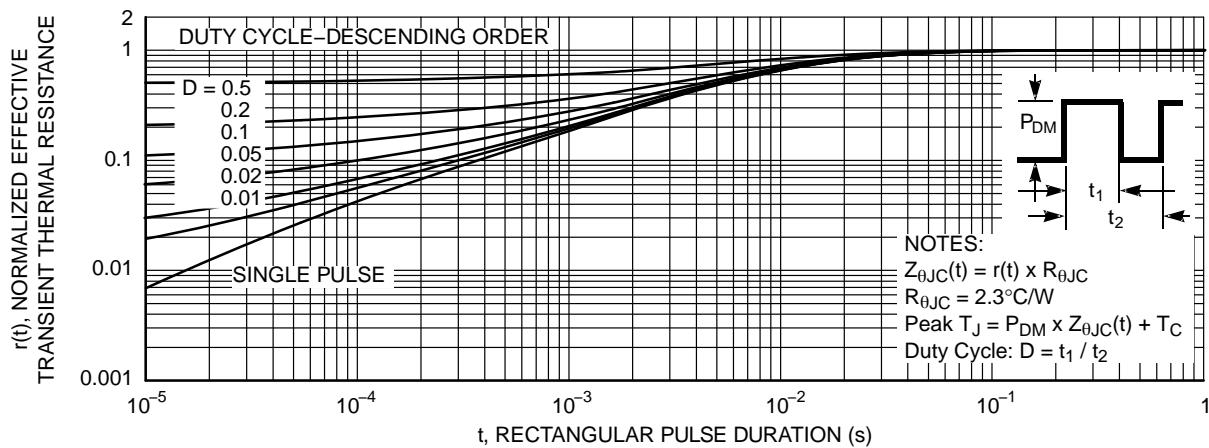


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

PACKAGE MARKING AND ORDERING INFORMATION

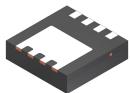
Device	Device Marking	Package Type	Reel Size	Tape Width	Shipping [†]
FDMC86160ET100	FDMC86160ET	WDFN8 3.3x3.3, 0.65P Power 33	13"	12 mm	3000 / Tape & Reel

[†]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.

MECHANICAL CASE OUTLINE

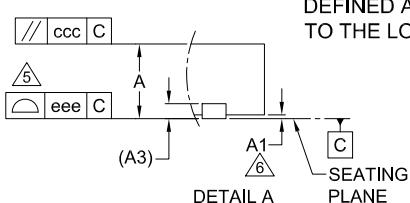
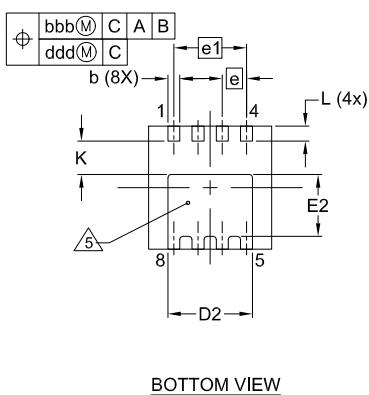
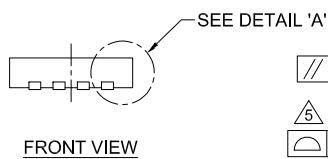
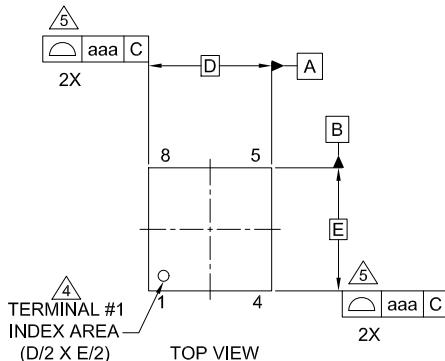
PACKAGE DIMENSIONS

onsemi™

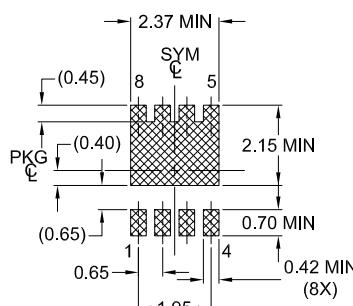


WDFN8 3.30x3.30x0.75, 0.65P
CASE 483AW
ISSUE B

DATE 22 MAR 2024



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.

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

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