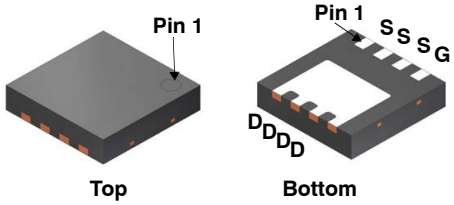
MOSFET – N-Channel, Shielded Gate, POWERTRENCH®

80 V, 6.5 mΩ , 48 A

FDMC86340



WDFN8
CASE 483AW

Description

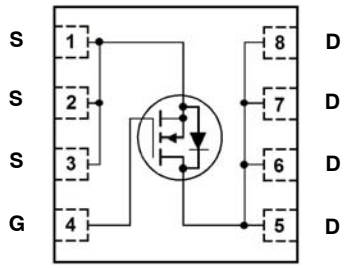
This N−Channel MOSFET is produced using **onsemi**'s advanced POWETRENCH process that incorporates Shielded Gate technology. This process has been optimized for the on−state resistance and yet maintain superior switching performance.

Features

- Shielded Gate MOSFET Technology
- Max $R_{DS(on)}$ = 6.5 mΩ at V_{GS} = 10 V, I_D = 14 A
- Max $R_{DS(on)}$ = 8.5 mΩ at V_{GS} = 8 V, I_D = 12 A
- High Performance Technology for Extremely Low $R_{DS(on)}$
- Termination is Lead−Free
- RoHS Compliant

Applications

- DC−DC Conversion



MARKING DIAGRAM

$Y	=	**onsemi** Logo
Z	=	Assembly Plant Code
XYY	=	Date Code (Year &Week)
KK	=	Lot Traceability Code
FDMC86340	=	Specific Device Code

MAXIMUM RATINGS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Ratings	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 T_A = 25°C (Note 1a)	 48 14	A
	− Pulsed (Note 4)	200	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	216	mJ
P_D	Power Dissipation T_C = 25°C T_A = 25°C (Note 1a)	 54 2.3	W
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.

ORDERING INFORMATION

Device	Package	Shipping†
FDMC86340	WDFN8 (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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THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case (Note 1)	2.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 1a)	53	

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	–	46	–	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	3.4	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	–	−10	–	mV/°C
$R_{DS(on)}$	Static Drain−to−Source On Resistance	V_{GS} = 10 V, I_D = 14 A	–	5.0	6.5	mΩ
		V_{GS} = 8 V, I_D = 12 A	–	6.0	8.5	
		V_{GS} = 10 V, I_D = 14 A, T_J = 125°C	–	8.5	11	
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 14 A	–	36	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 40 V, V_{GS} = 0 V, f = 1 MHz	–	2775	3885	pF
C_{oss}	Output Capacitance		–	468	655	pF
C_{rss}	Reverse Transfer Capacitance		–	15	25	pF
R_g	Gate Resistance		0.1	0.7	2.1	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 40 V, I_D = 14 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	20	32	ns
t_r	Rise Time		–	7.9	16	
$t_{d(off)}$	Turn−Off Delay Time		–	23	37	
t_f	Fall Time		–	5.1	10	
$Q_{g(tot)}$	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 40 V, I_D = 14 A	–	38	53	nC
$Q_{g(tot)}$	Total Gate Charge	V_{GS} = 0 V to 8 V, V_{DD} = 40 V, I_D = 14 A	–	31	44	
Q_{gs}	Gate−to−Source Charge	V_{DD} = 40 V, I_D = 14 A	–	14	–	
Q_{gd}	Gate−to−Drain “Miller” Charge	V_{DD} = 40 V, I_D = 14 A	–	8.0	–	
Q_{oss}	Output Charge	V_{DD} = 40 V, I_D = 0 V	–	42	–	

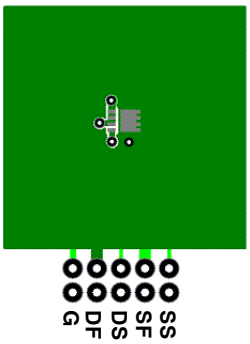
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
DRAIN−SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source−to−Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 14 A (Note 2)	–	0.80	1.3	V
		V_{GS} = 0 V, I_S = 1.9 A (Note 2)	–	0.7	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 14 A, di/dt = 100 A/μs	–	41	66	ns
Q_{rr}	Reverse Recovery Charge		–	25	40	nC

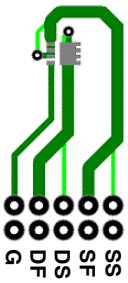
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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 × 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) 53°C/W when mounted on a 1 in^2 pad of 2 oz copper



b) 125°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 216 mJ is based on starting T_J = 25 °C, L = 3 mH, I_{AS} = 12 A, V_{DD} = 80 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 37 A.
4. Pulsed Id limited by junction temperature, td ≤ 100 μS, please refer to SOA curve for more details.

TYPICAL CHARACTERISTICS

(T_J = 25°C unless otherwise noted)

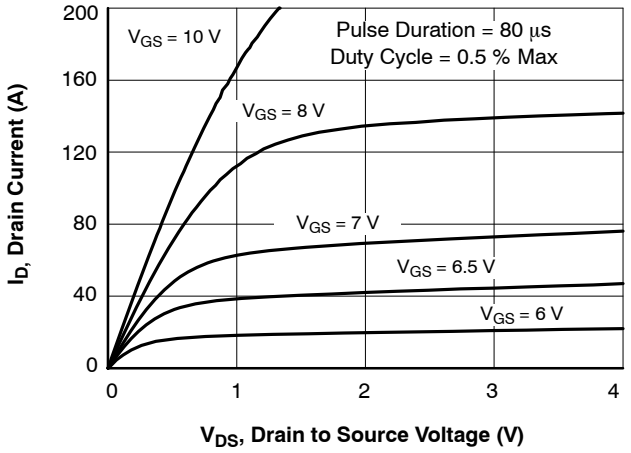


Figure 1. On−Region Characteristics

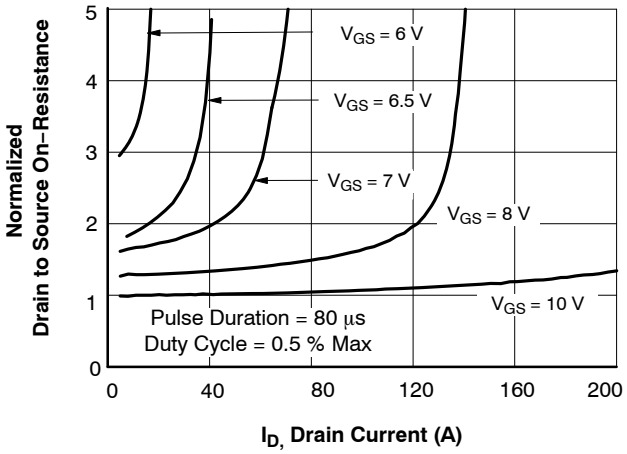


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

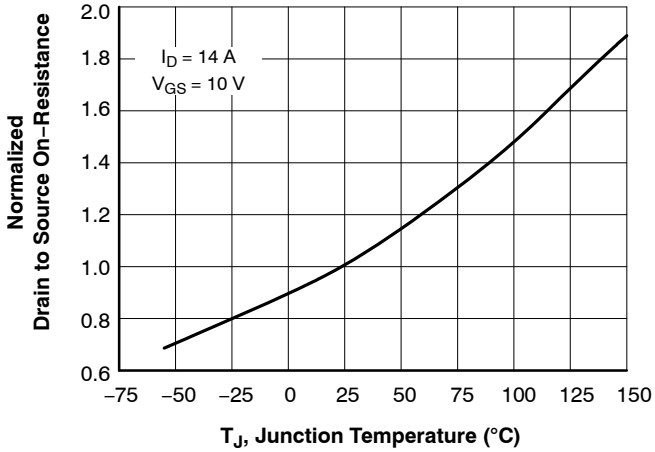


Figure 3. Normalized On−Resistance vs. Junction Temperature

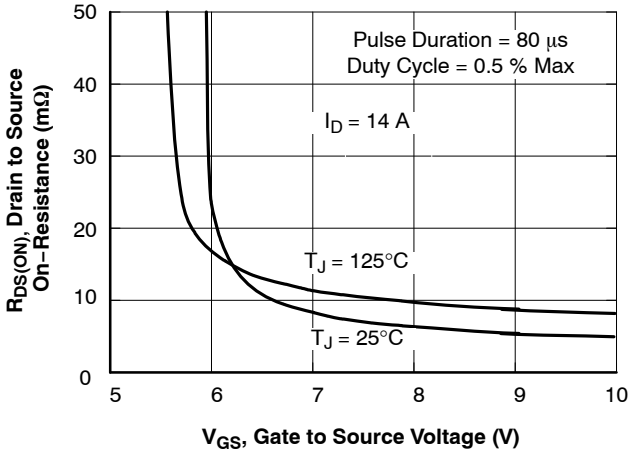


Figure 4. On−Resistance vs. Gate to Source Voltage

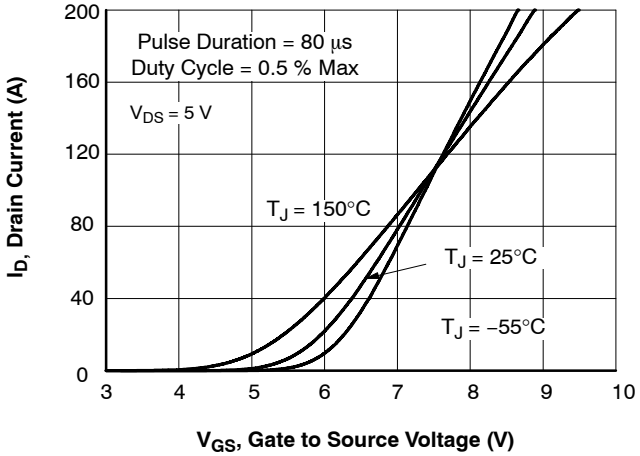


Figure 5. Transfer Characteristics

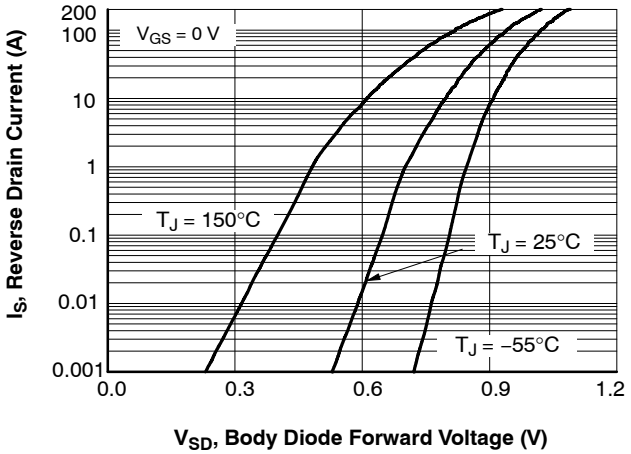


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

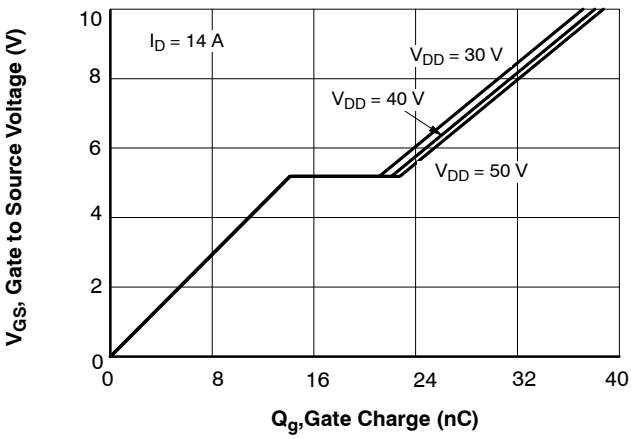


Figure 7. Gate Charge Characteristics

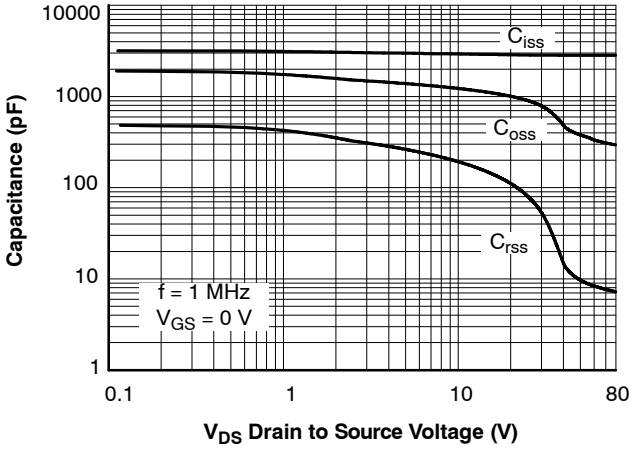


Figure 8. Capacitance vs Drain to Source Voltage

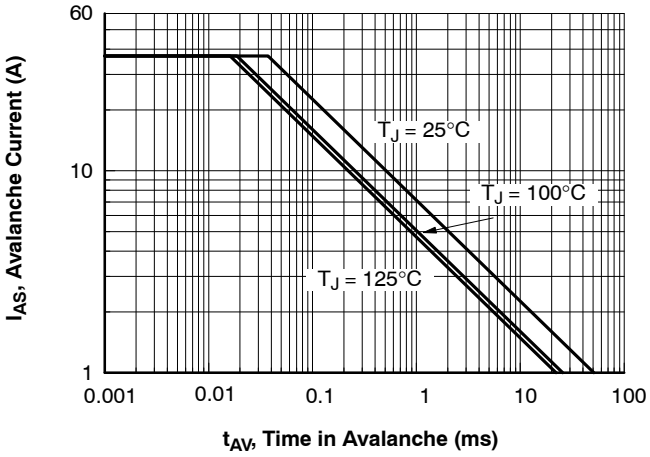


Figure 9. Unclamped Inductive Switching Capability

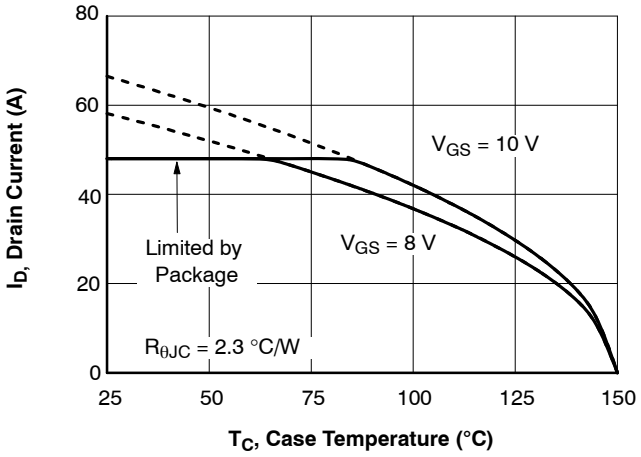


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

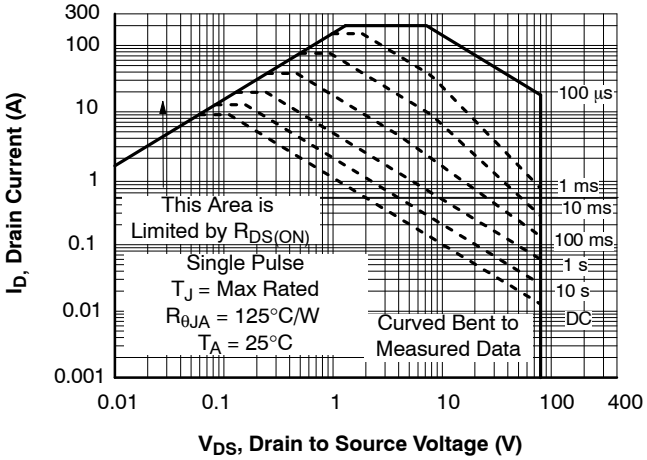


Figure 11. Forward Bias Safe Operating Area

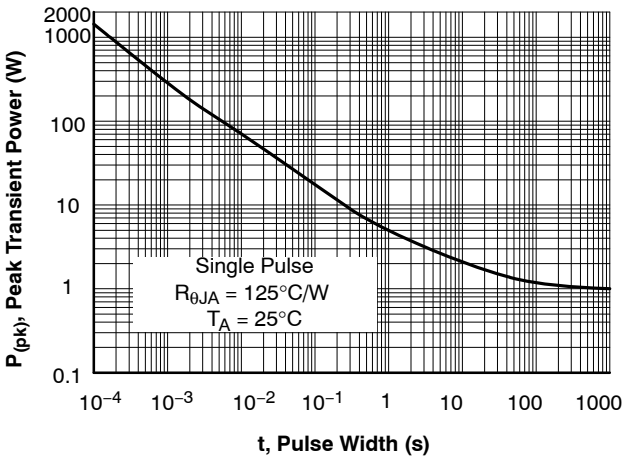


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

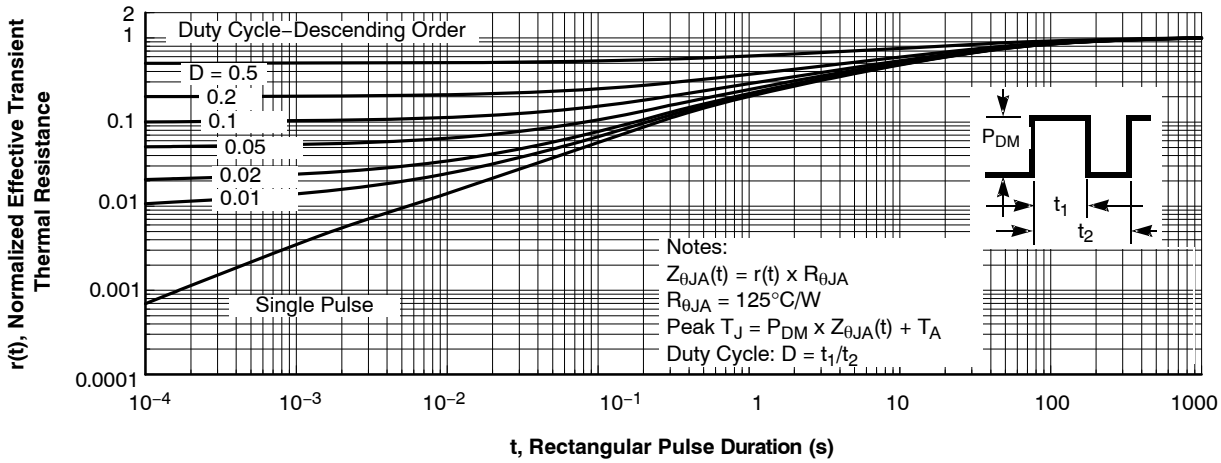


Figure 13. Junction−to−Ambient Transient Thermal Response Curve

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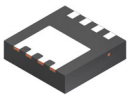
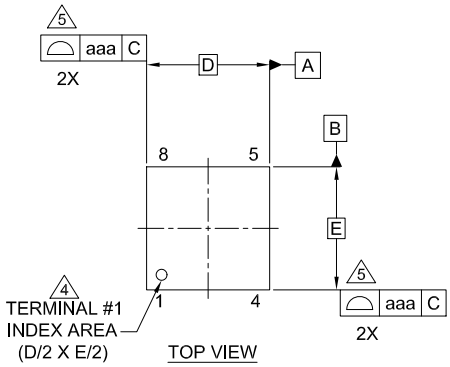
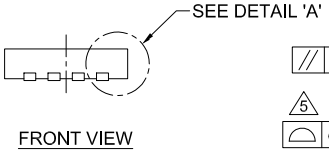
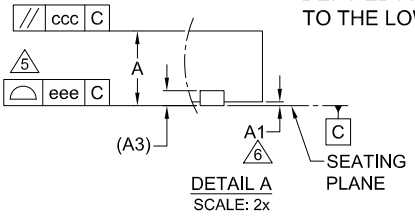


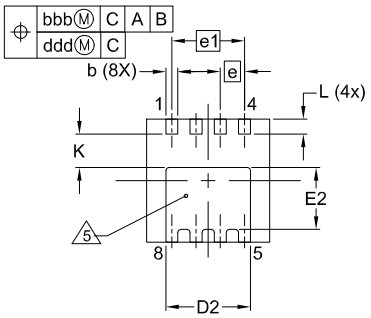
WDFN8 3.30x3.30x0.75, 0.65P
CASE 483AW
ISSUE B

DATE 22 MAR 2024







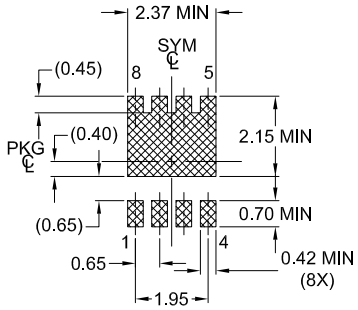


NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. THE TERMINAL #1 IDENTIFIER AND TERMINAL NUMBERING CONVENTION SHALL CONFORM TO JEP95 SEC. 3 SPP-12. DETAILS OF TERMINAL #1 IDENTIFIER ARE OPTIONAL, BUT MUST BE LOCATED WITHIN THE ZONE INDICATED. THE TERMINAL #1 IDENTIFIER MAY BE EITHER A MOLD, EMBEDDED METAL OR MARKED FEATURE.
5. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
6. 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.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	--	--	0.05
A3		0.20 REF	
b	0.27	0.32	0.37
D		3.30 BSC	
D2	2.17	2.27	2.37
E		3.30 BSC	
E2	1.56	1.66	1.76
e		0.65 BSC	
e1		1.95 BSC	
K	0.90	--	--
L	0.30	0.40	0.50
aaa		0.10	
bbb		0.10	
ccc		0.10	
ddd		0.05	
eee		0.05	

LAND PATTERN RECOMMENDATION



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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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DESCRIPTION:	**WDFN8 3.30x3.30x0.75, 0.65P**	**PAGE 1 OF 1**

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