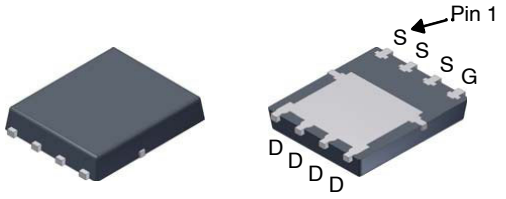
MOSFET - Shielded Gate N-Channel, POWERTRENCH®

60 V, 22 A, 8.2 mΩ

FDMS86520L

V_{DS}	$R_{DS(on)}$ MAX	I_D Max
60 V	11.7 mΩ @ V_{GS} = 4.5 V	11.5 A
	8.2 mΩ @ V_{GS} = 6 V	13.5 A



Top Bottom

PQFN8 5X6, 1.27P
Power 56
CASE 483AE

General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency and to minimize switch node ringing of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(on)}$, fast switching speed and body diode reverse recovery performance.

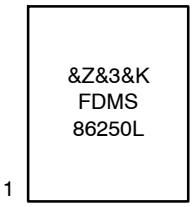
Features

- Max $R_{DS(on)}$ = 8.2 mΩ at V_{GS} = 10 V, I_D = 13.5 A
- Max $R_{DS(on)}$ = 11.7 mΩ at V_{GS} = 4.5 V, I_D = 11.5 A
- Advanced Package and Silicon Combination for Low $R_{DS(on)}$ and High Efficiency
- MSL1 Robust Package Design
- 100% UIL Tested
- This Device is Halide Free and RoHS Compliant with Exemption 7a, Pb-Free 2LI (on second level interconnection)

Applications

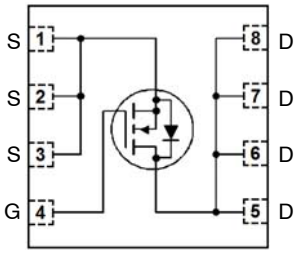
- Primary Switch in Isolated DC-DC
- Synchronous Rectifier
- Load Switch

MARKING DIAGRAM



&Z = Assembly Plant Code
& = 3-Digit Date Code
&K = 2-Digits Lot Run Code
FDMS86520L = Specific Device Code

PIN CONNECTIONS



ORDERING INFORMATION

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

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

Symbol	Parameter		Rating	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 °C	22	A
		Continuous, T_A = 25 °C (Note 1a)	13.5	
		Pulsed (Note 3)	60	
E_{AS}	Single Pulse Avalanche Energy (Note 3)		91	mJ
P_D	Power Dissipation	T_C = 25 °C	69	W
		T_A = 25 °C (Note 1a)	2.5	
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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	50	

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain-to-Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		29		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate-to-Source Leakage Current, Forward	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	1	1.8	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate-to-Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		−7		mV/°C
$R_{DS(on)}$	Static Drain-to-Source On Resistance	V_{GS} = 10 V, I_D = 13.5 A		6.7	8.2	mΩ
		V_{GS} = 4.5 V, I_D = 11.5 A		9.1	11.7	
		V_{GS} = 10 V, I_D = 13.5 A, T_J = 125 °C		9.6	11.8	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 13.5 A		51		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 30 V, V_{GS} = 0 V, f = 1 MHz		3470	4615	pF
C_{oss}	Output Capacitance			625	835	pF
C_{rss}	Reverse Transfer Capacitance			25	45	pF
R_g	Gate Resistance			0.6		Ω

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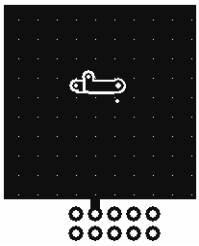
ELECTRICAL CHARACTERISTICS (T_J = 25 °C unless otherwise noted) (continued)

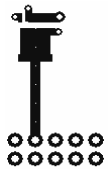
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30 V, I_D = 13.5 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		15	27	ns
t_r	Rise Time			5.6	11	ns
$t_{d(off)}$	Turn-Off Delay Time			32	52	ns
t_f	Fall Time			3.4	10	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 30 V, I_D = 13.5 A		45	63	nC
	Total Gate Charge	V_{GS} = 0 V to 4.5 V, V_{DD} = 30 V, I_D = 13.5 A		21	30	nC
Q_{gs}	Gate-to-Source Charge	V_{DD} = 30 V, I_D = 13.5 A		9.5		nC
Q_{gd}	Gate-to-Drain “Miller” Charge			4.7		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.1 A (Note 2)		0.72	1.2	V
		V_{GS} = 0 V, I_S = 13.5 A (Note 2)		0.83	1.3	
t_{rr}	Reverse Recovery Time	I_F = 13.5 A, di/dt = 100 A/μs		37	60	ns
Q_{rr}	Reverse Recovery Charge			21	34	nC
t_{rr}	Reverse Recovery Time	I_F = 13.5 A, di/dt = 300 A/μs		30	48	ns
Q_{rr}	Reverse Recovery Charge			37	59	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 in^2 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. 50 °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. Starting T_J = 25 °C, L = 1 mH, I_{AS} = 13.5 A, V_{DD} = 54 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 29 A.

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

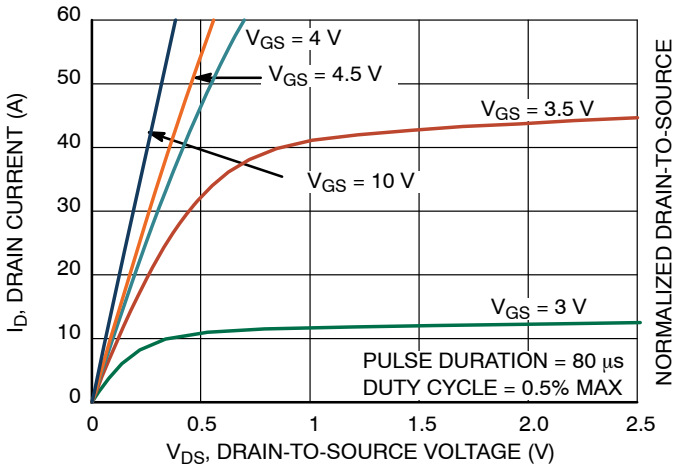

Figure 1. On Region Characteristics

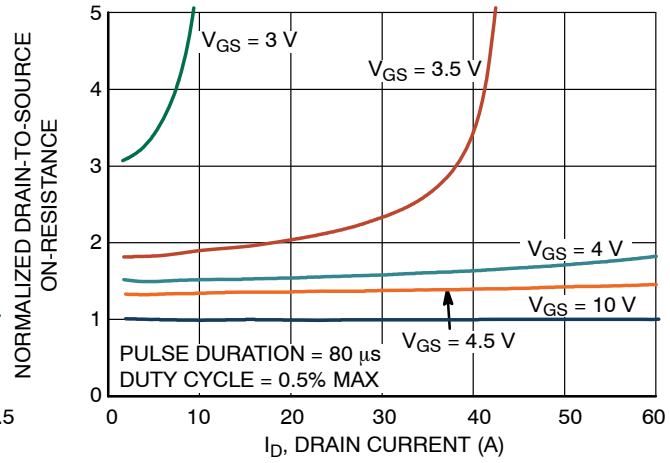

Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

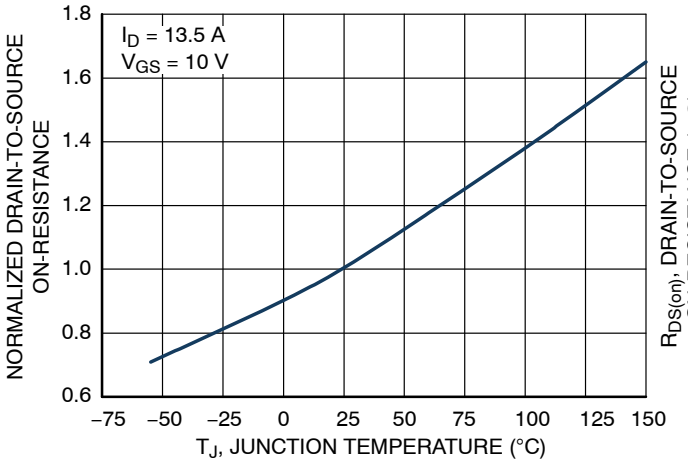

Figure 3. Normalized On Resistance vs. Junction Temperature

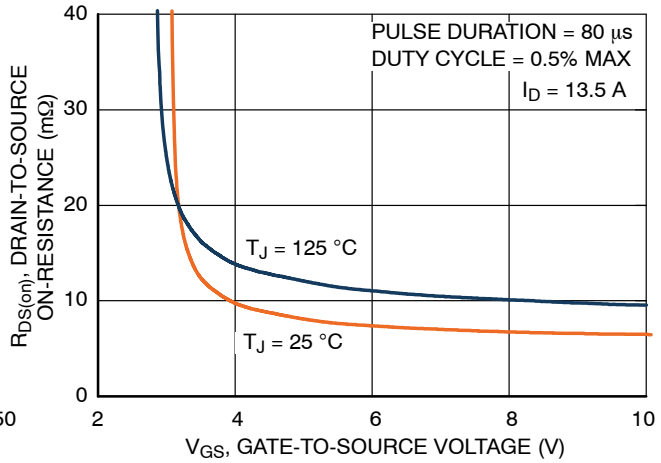

Figure 4. On-Resistance vs. Gate-to-Source Voltage

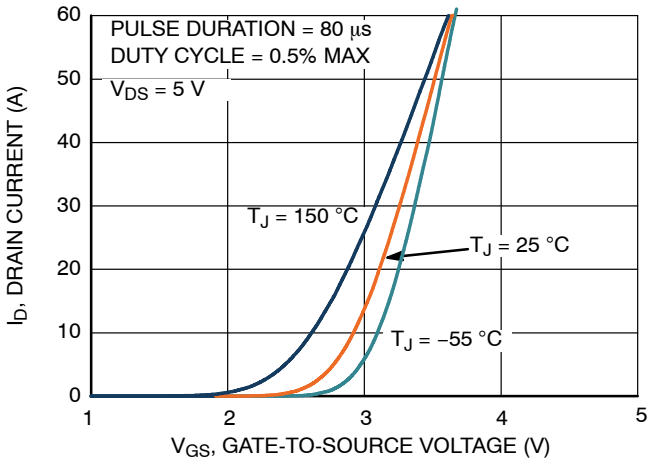

Figure 5. Transfer Characteristics

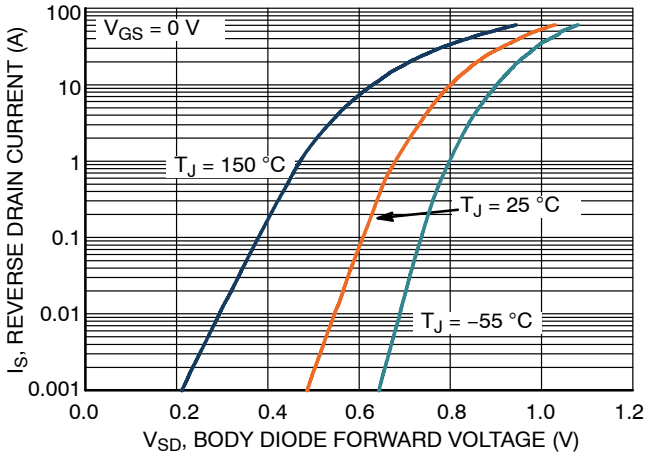

Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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TYPICAL CHARACTERISTICS (T_J = 25 °C unless otherwise noted) (continued)

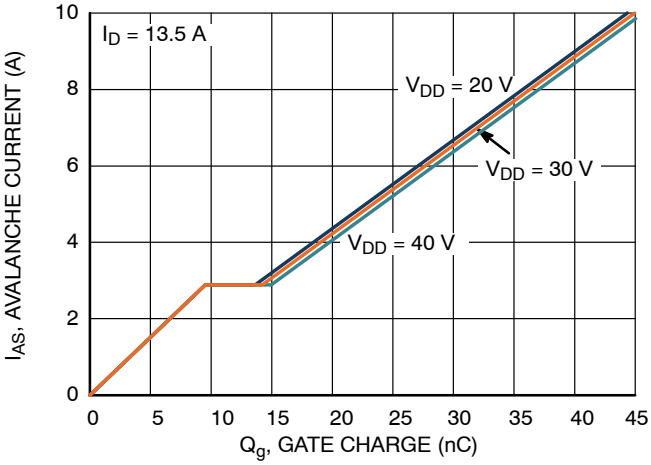

Figure 7. Gate Charge Characteristics

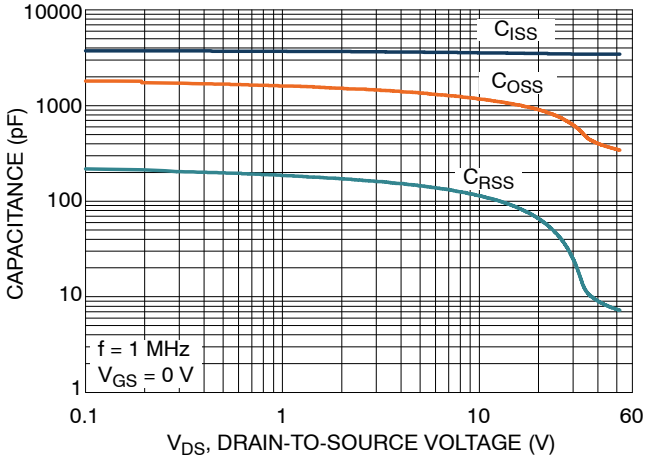

Figure 8. Capacitance vs. Drain to Source Voltage

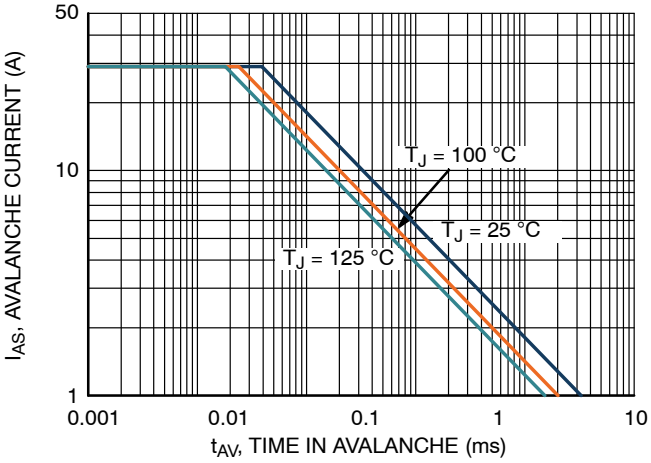

Figure 9. Unclamped Inductive Switching Capability

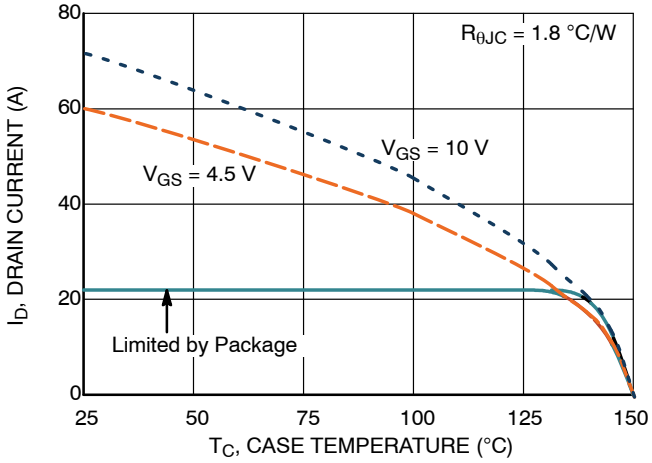

Figure 10. Maximum Continuous Drain Current vs. Case Temperature

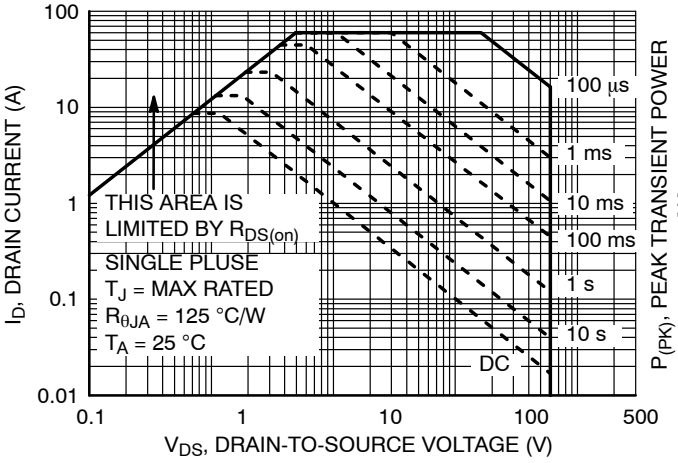

Figure 11. Forward Bias Safe Operating Area

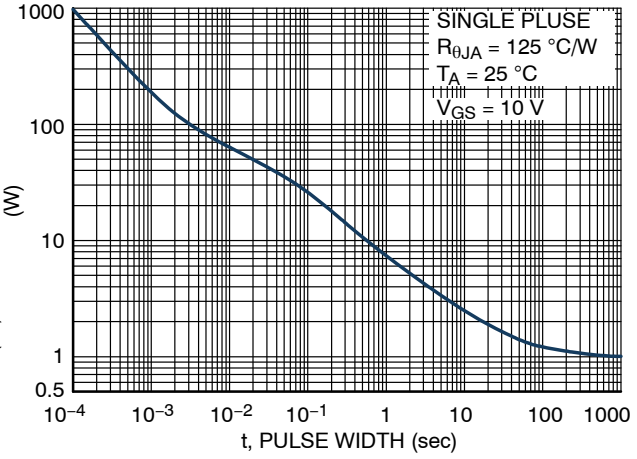

Figure 12. Single Pulse Maximum Power Dissipation

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TYPICAL CHARACTERISTICS (T_J = 25 °C unless otherwise noted) (continued)

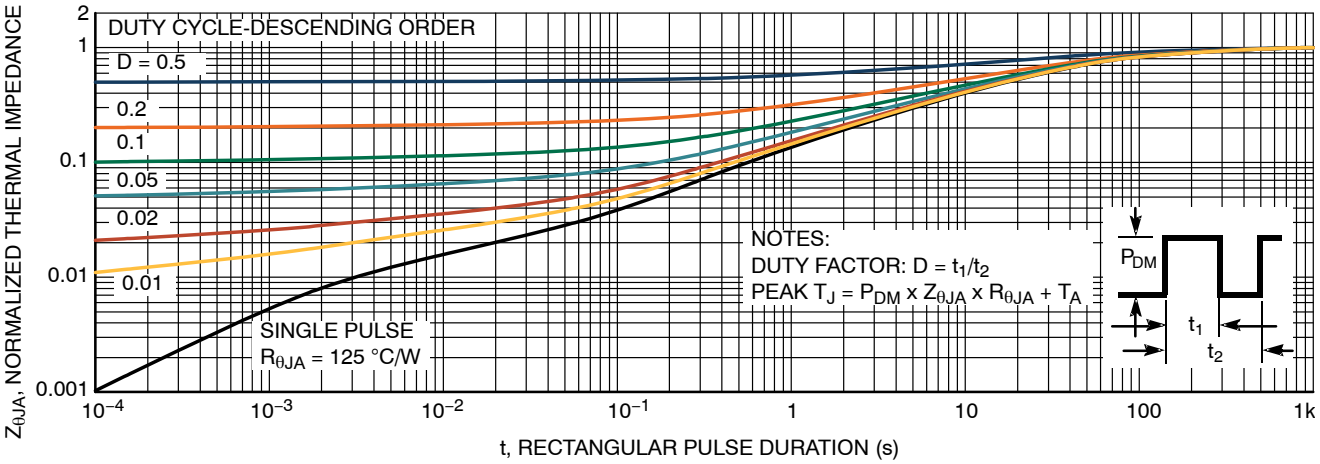

Figure 13. Junction-to-Ambient Transient Thermal Response Curve

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package Type	Reel Size	Tape Width	Shipping†
FDMS86520L	FDMS86520L	PQFN8 5X6, 1.27P Power 56	13”	12 mm	3000 / Tape & Reel
FDMS86520L-NC					

† 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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REVISION HISTORY

Revision	Description of Changes	Date
4	Converted the document to **onsemi** format. Added new OPN.	5/13/2026

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

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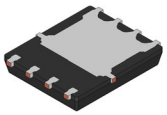
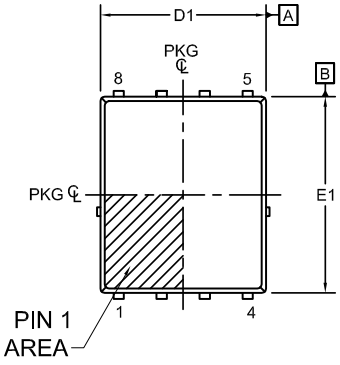
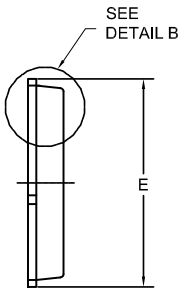


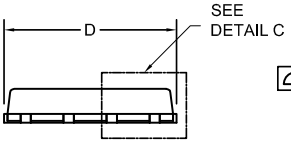
PQFN8 5X6, 1.27P
CASE 483AE
ISSUE C

DATE 21 JAN 2022

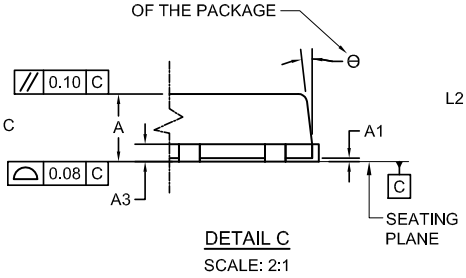


TOP VIEW

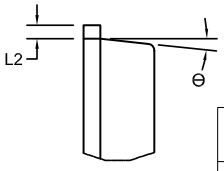




SIDE VIEW



DETAIL C
SCALE: 2:1

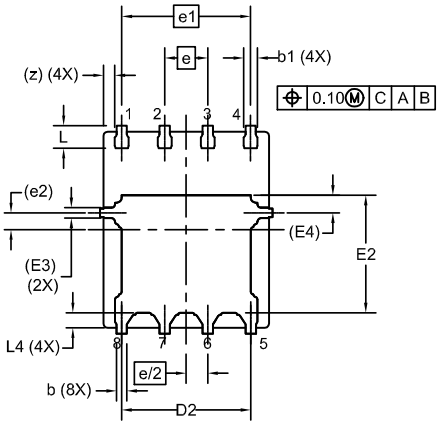


DETAIL B
SCALE: 2:1

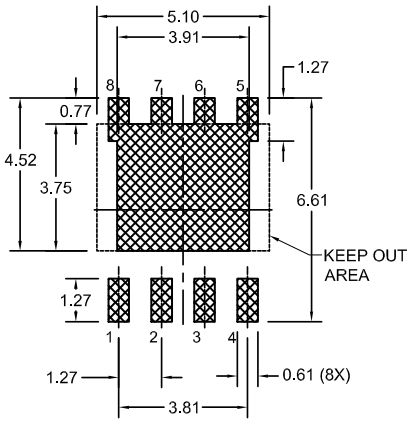
NOTES:

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	0.90	1.00	1.10
A1	0.00	-	0.05
b	0.21	0.31	0.41
b1	0.31	0.41	0.51
A3	0.15	0.25	0.35
D	4.90	5.00	5.20
D1	4.80	4.90	5.00
D2	3.61	3.82	3.96
E	5.90	6.15	6.25
E1	5.70	5.80	5.90
E2	3.38	3.48	3.78
E3	0.30 REF		
E4	0.52 REF		
e	1.27 BSC		
e/2	0.635 BSC		
e1	3.81 BSC		
e2	0.50 REF		
L	0.51	0.66	0.76
L2	0.05	0.18	0.30
L4	0.34	0.44	0.54
z	0.34 REF		
Θ	0°	-	12°



BOTTOM VIEW



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.

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DESCRIPTION:	**PQFN8 5X6, 1.27P**		**PAGE 1 OF 1**

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