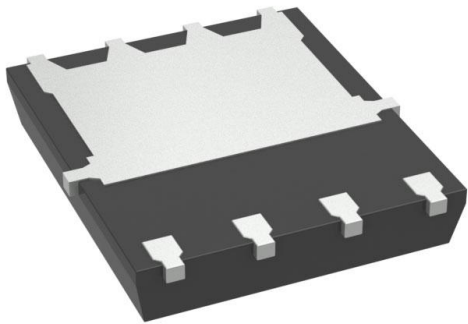


FDMS86181 Datasheet

www.digi-electronics.com



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	FDMS86181-DG
Manufacturer	onsemi
Manufacturer Product Number	FDMS86181
Description	MOSFET N-CH 100V 44A/124A 8PQFN
Detailed Description	N-Channel 100 V 44A (Ta), 124A (Tc) 2.5W (Ta), 125 W (Tc) Surface Mount 8-PQFN (5x6)



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

FDMS86181

Series:

PowerTrench®

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

100 V

Drive Voltage (Max Rds On, Min Rds On):

6V, 10V

Vgs(th) (Max) @ Id:

4V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

8-PQFN (5x6)

Base Product Number:

FDMS86

Manufacturer:

onsemi

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

44A (Ta), 124A (Tc)

Rds On (Max) @ Id, Vgs:

4.2mOhm @ 44A, 10V

Gate Charge (Qg) (Max) @ Vgs:

59 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

4125 pF @ 50 V

Power Dissipation (Max):

2.5W (Ta), 125W (Tc)

Mounting Type:

Surface Mount

Package / Case:

8-PowerTDFN

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

MOSFET - Power, Single N-Channel, Shielded Gate, POWER trench[®]

100 V, 124 A, 4.2 mΩ

FDMS86181

General Description

This N-Channel MV MOSFET is produced using onsemi's advanced POWER trench[®] process that incorporates Shielded Gate technology. This process has been optimized to minimise on-state resistance and yet maintain superior switching performance with best in class soft body diode.

Features

- Shielded Gate MOSFET Technology
- Max $r_{DS(on)}$ = 4.2 mΩ at $V_{GS} = 10$ V, $I_D = 44$ A
- Max $r_{DS(on)}$ = 12 mΩ at $V_{GS} = 6$ V, $I_D = 22$ A
- ADD
- 50% lower Q_{rr} than other MOSFET suppliers
- Lowers switching noise/EMI
- MSL1 robust package design
- 100% UIL tested
- RoHS Compliant

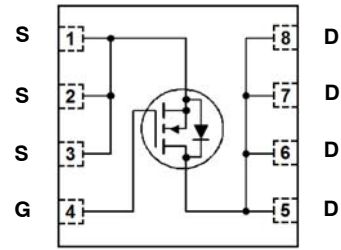
Applications

- Primary DC-DC MOSFET
- Synchronous Rectifier in DC-DC and AC-DC
- Motor Drive
- Solar

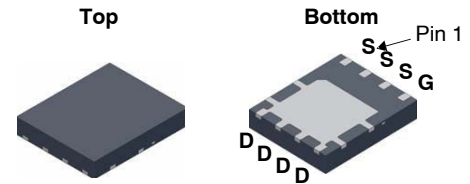
MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	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) - Continuous $T_C = 100^\circ\text{C}$ (Note 5) - Continuous $T_A = 25^\circ\text{C}$ (Note 1a) - Pulsed (Note 4)	124 78 17 510	A
E_{AS}	Single Pulse Avalanche Energy (Note 3)	337	mJ
P_D	Power Dissipation: $T_C = 25^\circ\text{C}$ $T_A = 25^\circ\text{C}$ (Note 1a)	125 2.5	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

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.

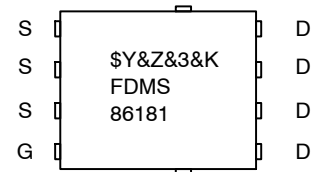


N-Channel MOSFET



Power 56
(PQFN8)
CASE 483AE

MARKING DIAGRAM



\$Y	= onsemi Logo
&Z	= Assembly Plant Code
&3	= Data Code (Year & Week)
&K	= Lot
FDMS86181	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

FDMS86181**PACKAGE MARKING AND ORDERING INFORMATION**

Device Marking	Device	Package	Quantity
FDMS86181	FDMS86181	Power 56 (PQFN8) (Pb-Free / Halogen 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 Specifications Brochure, BRD8011/D.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
--------	-----------	----------------	-----	-----	-----	------

OFF CHARACTERISTICS

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}$, $V_{GS} = 0 \text{ V}$	100			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C		60		mV/°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, Forward	$V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0 \text{ V}$			100	nA

ON CHARACTERISTICS

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250 \mu\text{A}$	2.0	3.1	4.0	V
$\Delta V_{GS(th)} / \Delta T_J$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C		-9		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}$, $I_D = 44 \text{ A}$		3.3	4.2	m Ω
		$V_{GS} = 6 \text{ V}$, $I_D = 22 \text{ A}$		5.3	12	
		$V_{GS} = 10 \text{ V}$, $I_D = 44 \text{ A}$, $T_J = 125^\circ\text{C}$		5.7	7.8	
g_{FS}	Forward Transconductance	$V_{DS} = 10 \text{ V}$, $I_D = 44 \text{ A}$		116		S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 50 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$		2945	4125	pF
C_{oss}	Output Capacitance			1730	2425	pF
C_{rss}	Reverse Transfer Capacitance			20	40	pF
R_g	Gate Resistance	$f = 1 \text{ MHz}$	0.1	1.3	2.6	Ω

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50 \text{ V}$, $I_D = 44 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = 6 \Omega$		17	31	ns
t_r	Rise Time			9	18	ns
$t_{d(off)}$	Turn-Off Delay Time			25	40	ns
t_f	Fall Time			6	12	ns
Q_g	Total Gate Charge	$V_{GS} = 0 \text{ V}$ to 10 V , $V_{DD} = 50 \text{ V}$, $I_D = 44 \text{ A}$		42	59	nC
		$V_{GS} = 0 \text{ V}$ to 6 V , $V_{DD} = 50 \text{ V}$, $I_D = 44 \text{ A}$		27	38	nC
Q_{gs}	Gate to Source Charge	$V_{DD} = 50 \text{ V}$, $I_D = 44 \text{ A}$		13		nC
Q_{gd}	Gate to Drain "Miller" Charge			9.3		nC

FDMS86181

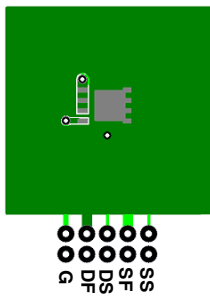
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _{SD}	Source to Drain Diode Forward Voltage	V _{GS} = 0 V, I _S = 2.1 A (Note 2)		0.7	1.2	V
		V _{GS} = 0 V, I _S = 44 A (Note 2)		0.8	1.3	
t _{rr}	Reverse Recovery Time	I _F = 20 A, di/dt = 300 A/μs		32	52	ns
Q _{rr}	Reverse Recovery Charge			57	92	
t _{rr}	Reverse Recovery Time	I _F = 20 A, di/dt = 1000 A/μs		25	40	ns
Q _{rr}	Reverse Recovery Charge			158	253	

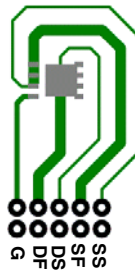
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

- R_{θJA} is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR-4 material. R_{θCA} is determined by the user's board design.



a. 50 °C/W when mounted on a 1 in² pad of 2 oz copper.



b. 125 °C/W when mounted on a minimum pad of 2 oz copper.

- Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
- E_{AS} of 337 mJ is based on starting T_J = 25°C, N-CH: L = 3 mH, I_{AS} = 15 A, V_{DD} = 100 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 49 A.
- Pulsed Id please refer to Figure 11 SOA graph for more details.
- 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)

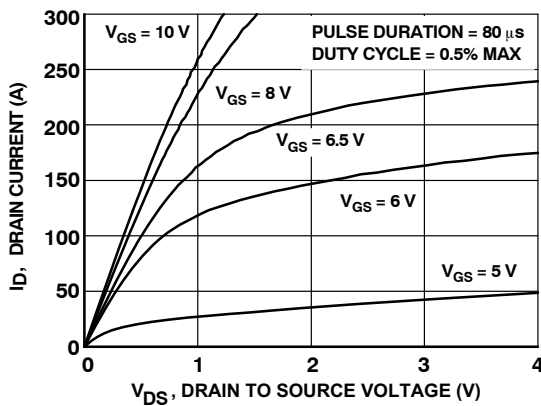


Figure 1. On Region Characteristics

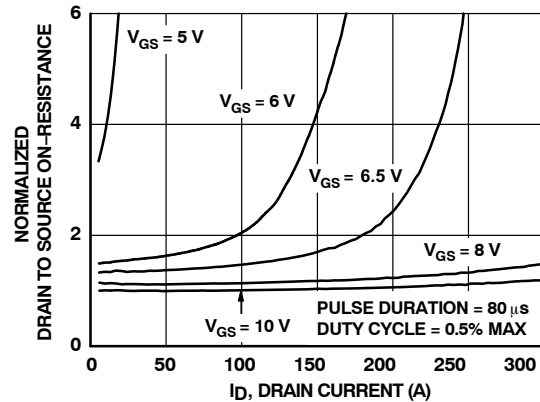


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

FDMS86181

TYPICAL CHARACTERISTICS (CONTINUED)

($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

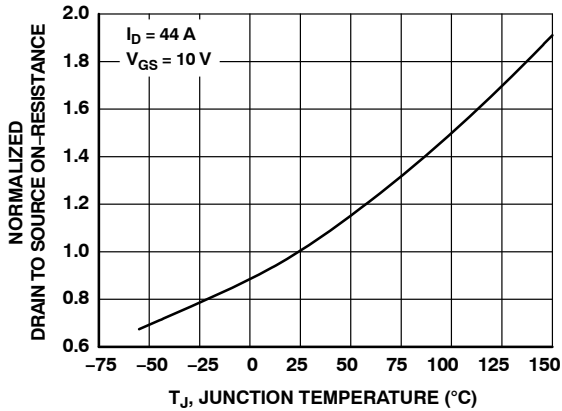


Figure 3. Normalized On Resistance vs. Junction Temperature

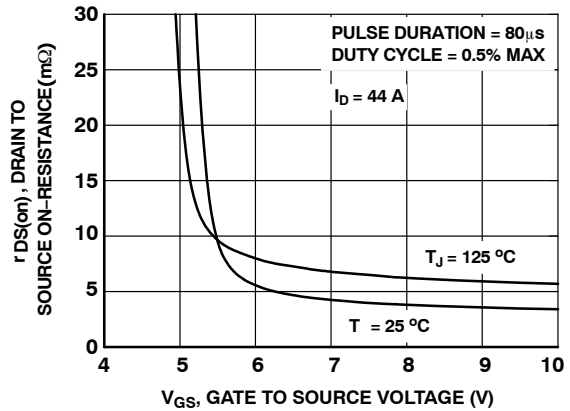


Figure 4. On-Resistance vs. Gate to Source Voltage

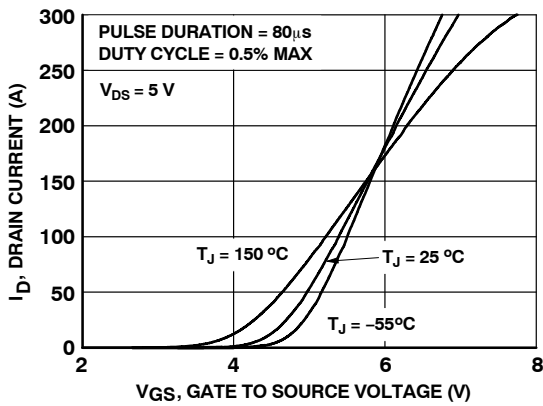


Figure 5. Transfer Characteristics

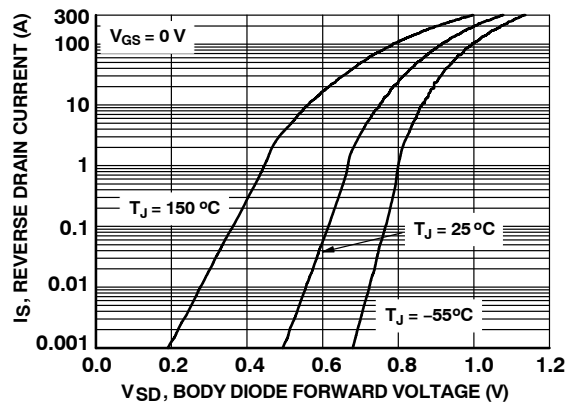


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

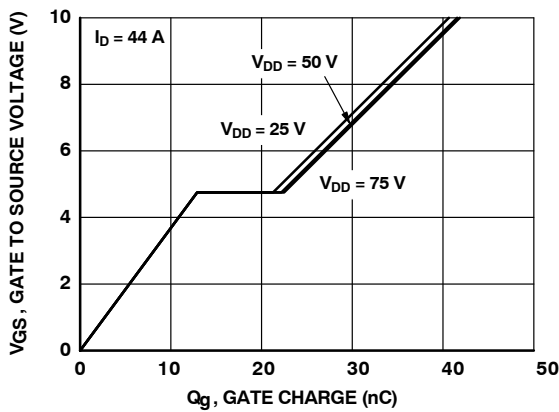


Figure 7. Gate Charge Characteristics

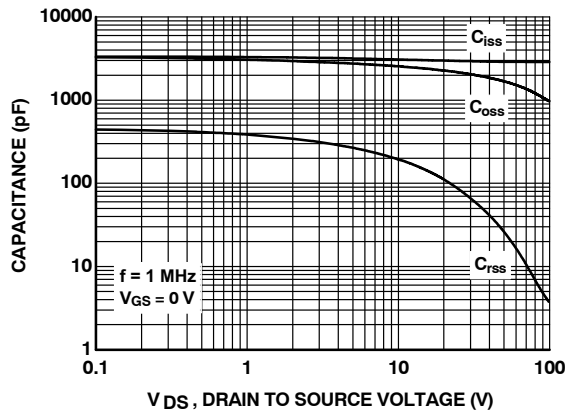


Figure 8. Capacitance vs. Drain to Source Voltage

FDMS86181

TYPICAL CHARACTERISTICS (CONTINUED)

($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

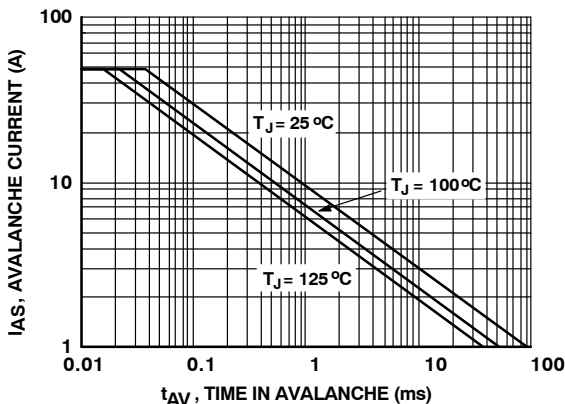


Figure 9. Unclamped Inductive Switching Capability

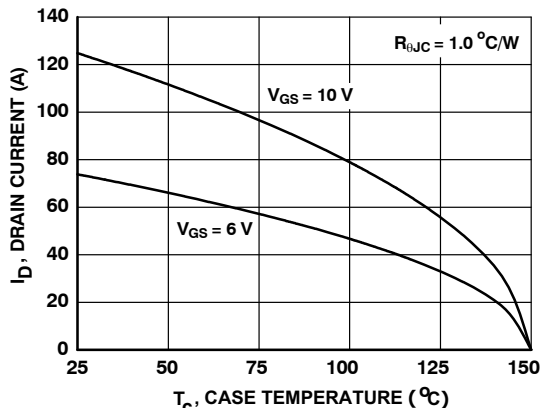


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

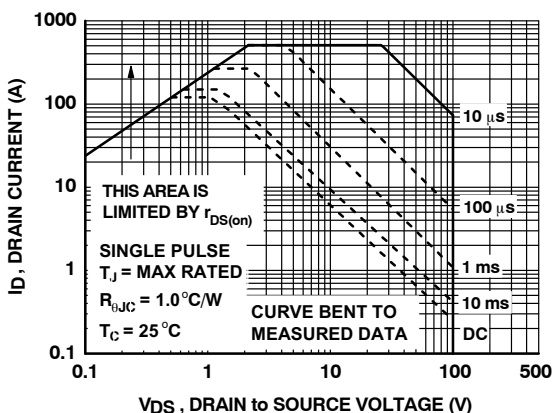


Figure 11. Forward Bias Safe Operating Area

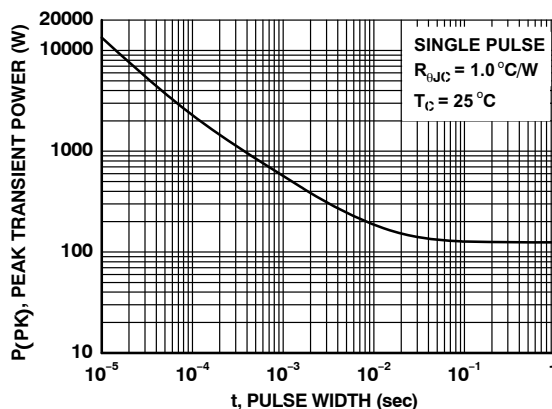


Figure 12. Single Pulse Maximum Power Dissipation

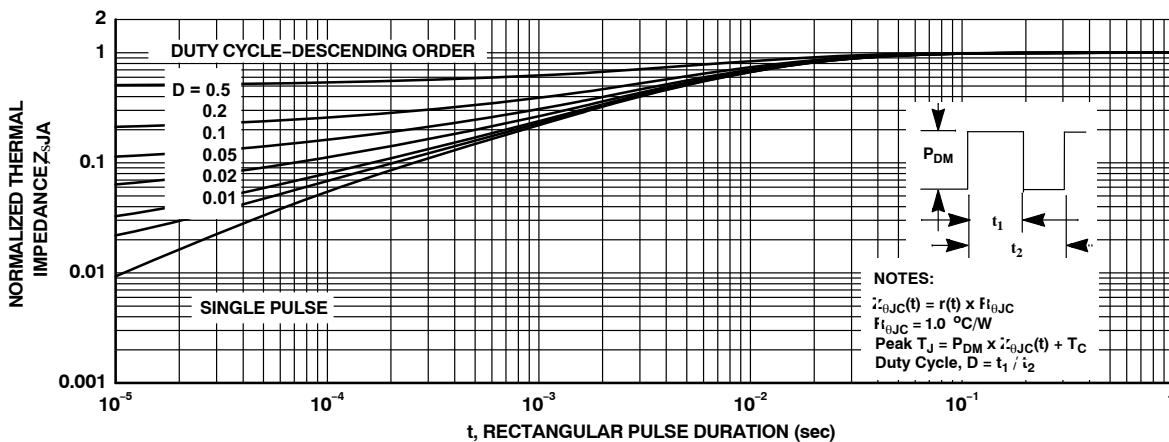
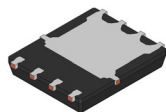


Figure 13. Transient Thermal Response Curve

POWERTRENCH is registered trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and or other countries.

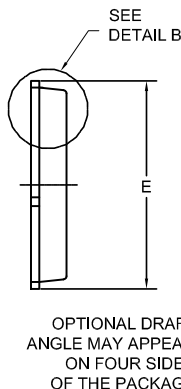
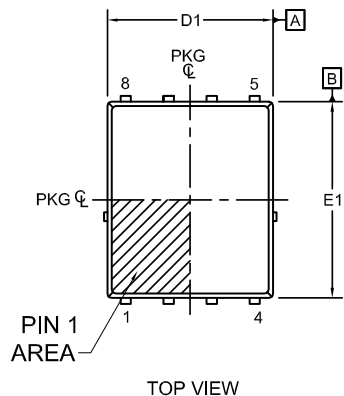


**MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS**



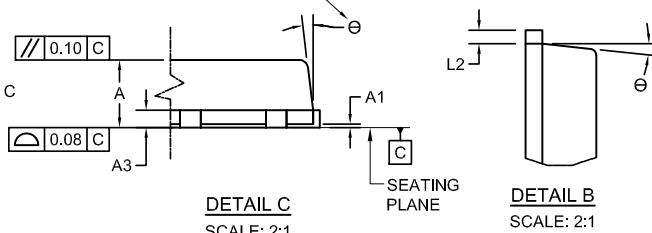
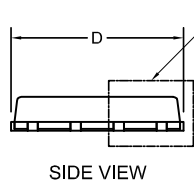
**PQFN8 5X6, 1.27P
CASE 483AE
ISSUE C**

DATE 21 JAN 2022

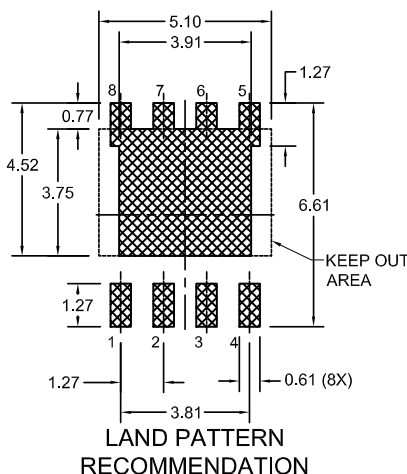
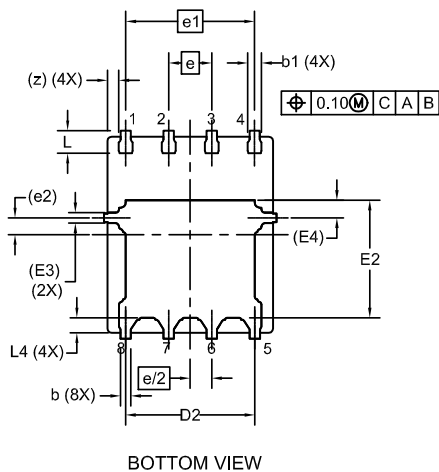


NOTES:

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°



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

DOCUMENT NUMBER:	98AON13655G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	PQFN8 5X6, 1.27P	PAGE 1 OF 1

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

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

OUR CERTIFICATE

DiGi provide top-quality products and perfect service for customer worldwide through standardization, technological innovation and continuous improvement. DiGi through third-party certification, we stricly control the quality of products and services. Welcome your RFQ to

Email: Info@DiGi-Electronics.com



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.