FDBL9403L-F085

Single N-Channel Power MOSFET

40 V, 240 A, 0.72 mΩ

Features

- Small Footprint (TOLL) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	40	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Notes 1, 3)	Steady State	T_C = 25°C	I_D	240	A
Power Dissipation $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	P_D	357.1	W
		T_C = 100°C		178.6	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	T_C = 25°C	I_D	53.3	A
		T_C = 100°C		37.7	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_C = 25°C	P_D	3.5	W
		T_C = 100°C		1.7	
Pulsed Drain Current	T_C = 25°C, t_p = 10 μs		I_{DM}	2113	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	100	A
Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 79 A, L = 0.2 mH)			E_{AS}	624	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°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.

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted. Current is limited by bondwire configuration.
2. Surface−mounted on FR4 board using a 650 mm^2, 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

ON Semiconductor®

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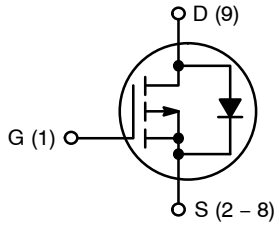
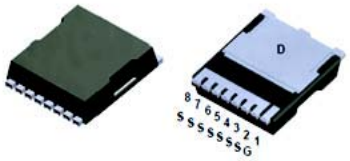
$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
40 V	0.72 mΩ @ 10 V	80 A
	0.98 mΩ @ 4.5 V	

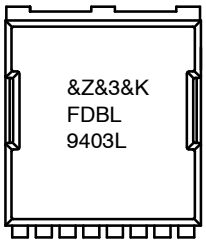


N-CHANNEL MOSFET



H−PSOF8L
CASE 100CU

MARKING DIAGRAM



&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FDBL9403L	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

Table 1. THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction−to−Case − Steady State	0.42	°C/W
$R_{\theta JA}$	Junction−to−Ambient − Steady State (Note 4)	43	

4. Surface−mounted on FR4 board using a 650 mm^2, 2 oz. Cu pad.

Table 2. ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	40	–	–	V
$V_{(BR)DSS}/T_J$	Drain-to-Source Breakdown Voltage Temperature Coefficienct		–	22.5	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 40 V, V_{GS} = 0 V, T_J = 25°C V_{DS} = 40 V, V_{GS} = 0 V, T_J = 175°C	– –	– –	1 1	μA mA
I_{GSS}	Zero Gate Voltage Drain Current	V_{DS} = 0 V, V_{GS} = ±20 V	–	–	±100	nA
ON CHARACTERISTICS (Note 5)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	1	1.75	3	V
$V_{GS(th)}/T_J$	Threshold Temperature Coefficient		–	−5.6	–	mV/°C
$R_{DS(on)}$	Drain−to−Source On Resistance	V_{GS} = 10 V, I_D = 80 A	–	0.59	0.72	mΩ
		V_{GS} = 4.5 V, I_D = 40 A	–	0.76	0.98	
CHARGES, CAPACITANCES & GATE RESISTANCE						
C_{iss}	Input Capacitance	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 20 V	–	14100	–	pF
C_{oss}	Output Capacitance		–	4070	–	
C_{rss}	Reverse Transfer Capacitance		–	300	–	
R_g	Gate Resistance	V_{GS} = 0.5 V, f = 1 MHz	–	3.3	–	Ω
$Q_{g(tot)}$	Total Gate Charge	V_{GS} = 4.5 V, V_{DS} = 32 V, I_D = 80 A	–	97	–	nC
		V_{GS} = 10 V, V_{DS} = 32 V, I_D = 80 A	–	203	–	
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0 V to 1 V	–	13	–	
Q_{gs}	Gate−to−Source Gate Charge	V_{DD} = 32 V, I_D = 80 A	–	40	–	
Q_{gd}	Gate−to−Drain “Miller” Charge		–	27	–	
V_{GP}	Plateau Voltage		–	3	–	V
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 20 V, I_D = 80 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	21	–	ns
t_r	Turn-On Rise Time		–	42	–	
$t_{d(off)}$	Turn-Off Delay Time		–	288	–	
t_f	Turn-Off Fall Time		–	101	–	
DRAIN-SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source−to−Drain Diode Voltage	I_{SD} = 80 A, V_{GS} = 0 V	–	0.79	1.25	V
		I_{SD} = 40 A, V_{GS} = 0 V	–	0.75	1.2	
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, dI_{SD}/dt = 100 A/μs, I_S = 80 A	–	96	–	ns
t_a	Charge Time		–	46	–	
t_b	Discharge Time		–	50	–	
Q_{rr}	Reverse Recovery Charge		–	130	–	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.

5. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

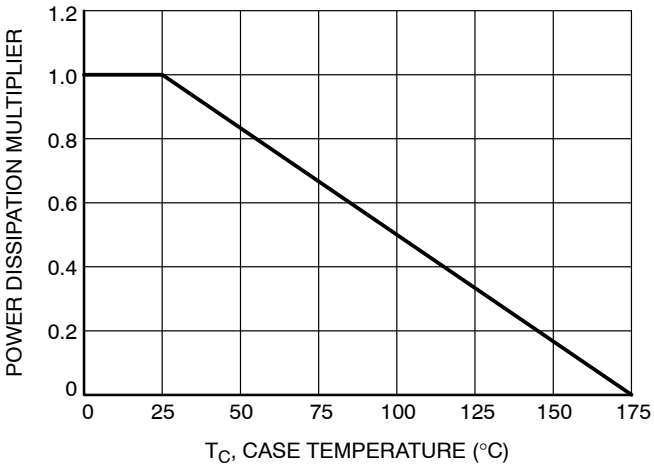


Figure 1. Normalized Power Dissipation vs. Case Temperature

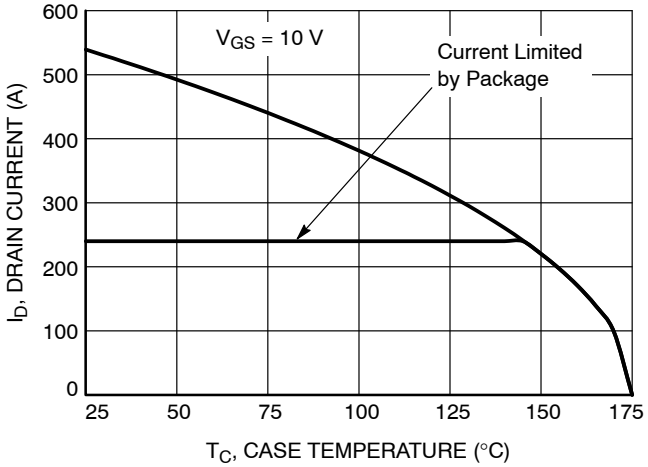


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

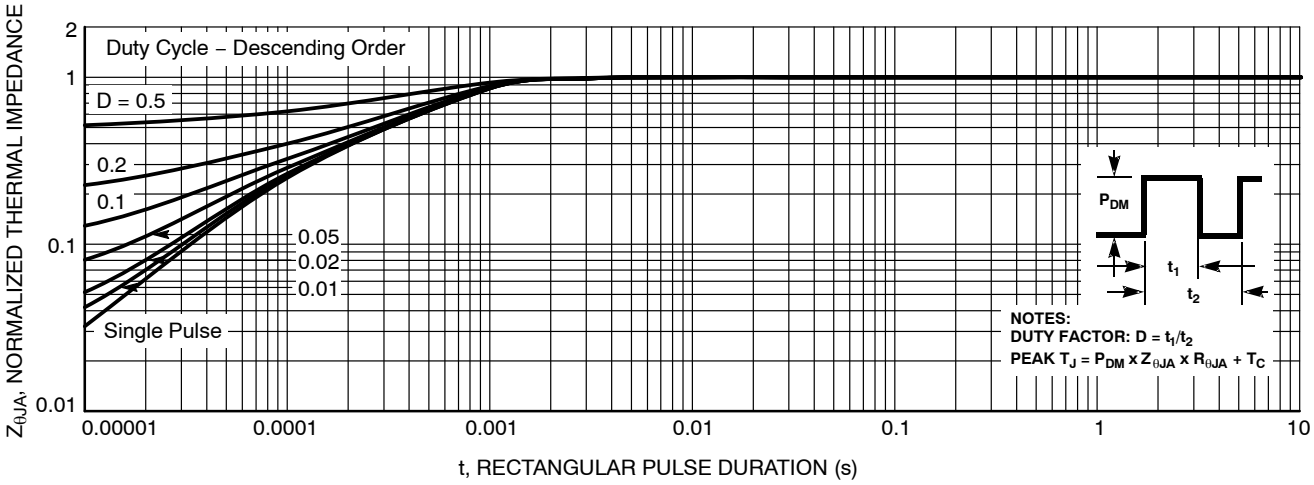


Figure 3. Normalized Maximum Transient Thermal Impedance

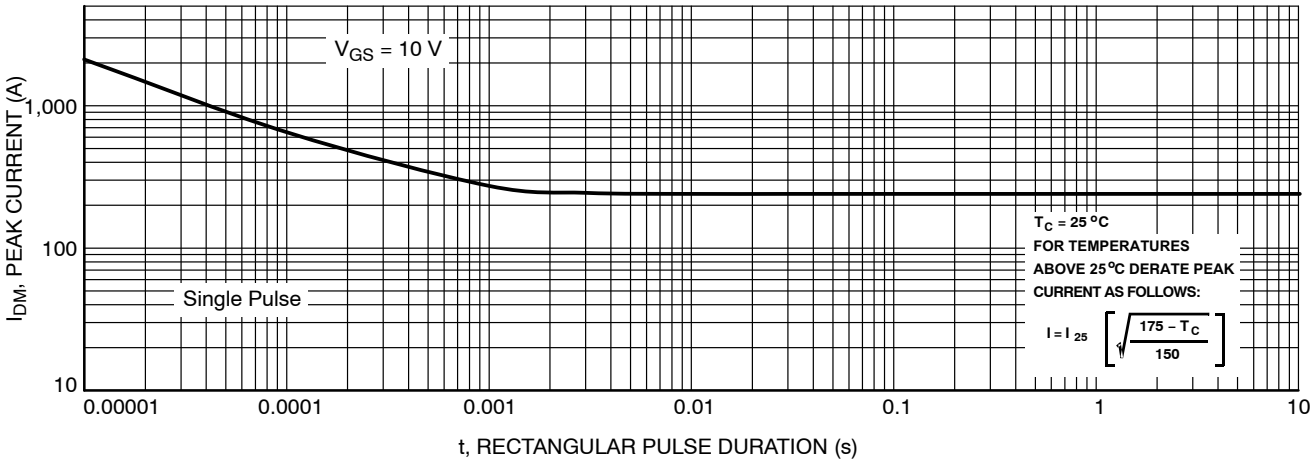


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS

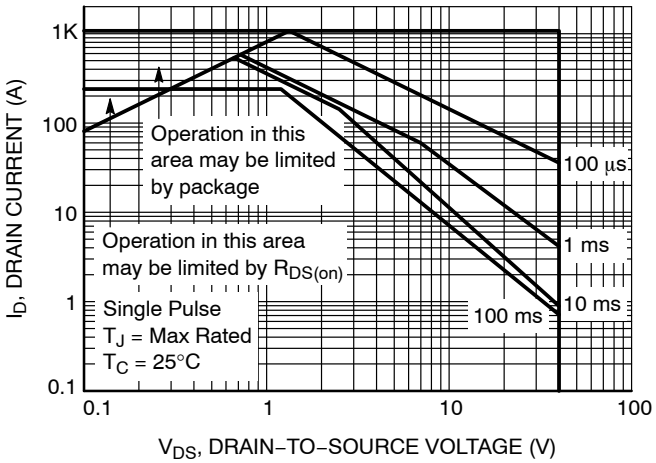


Figure 5. Forward Bias Safe Operating Area

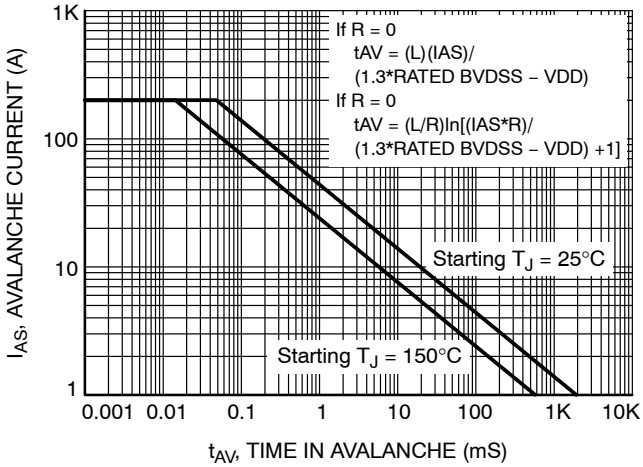


Figure 6. Unclamped Inductive Switching Capability

Note: Refer to ON Semiconductor Application Notes AN7514 and AN7515

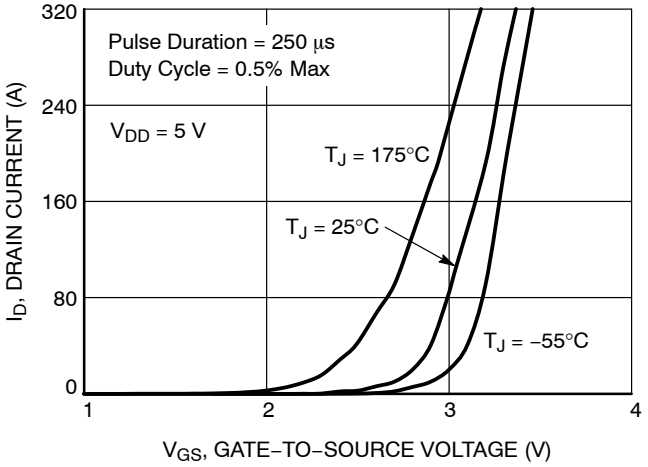


Figure 7. Transfer Characteristics

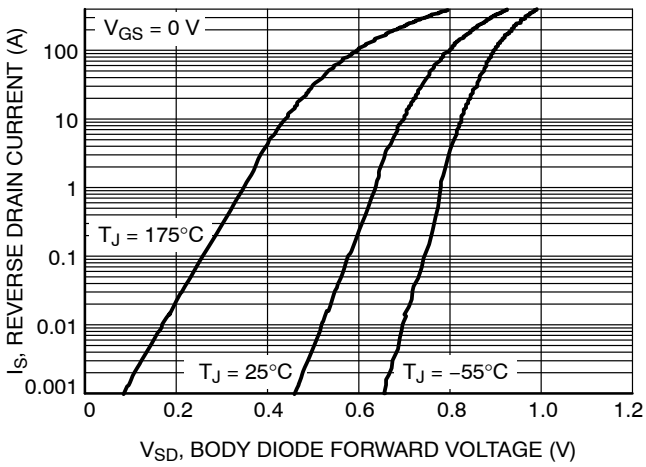


Figure 8. Forward Diode Characteristics

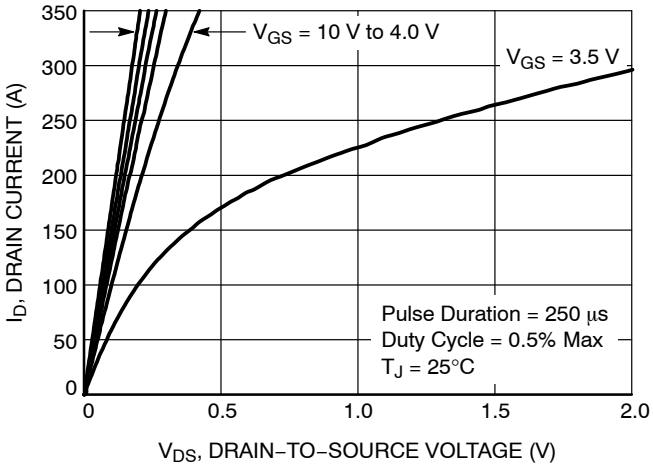


Figure 9. Saturation Characteristics

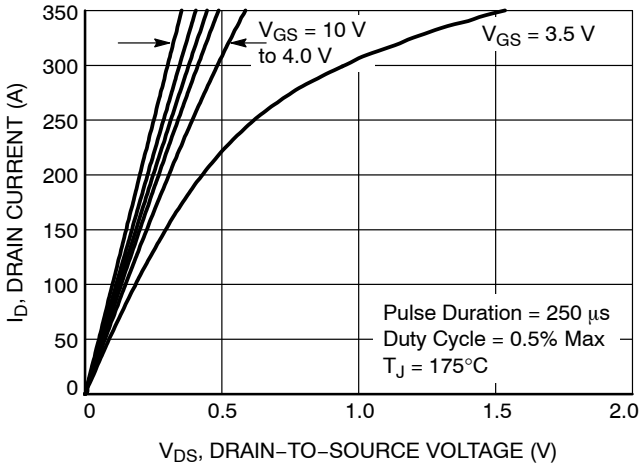


Figure 10. Saturation Characteristics

TYPICAL CHARACTERISTICS

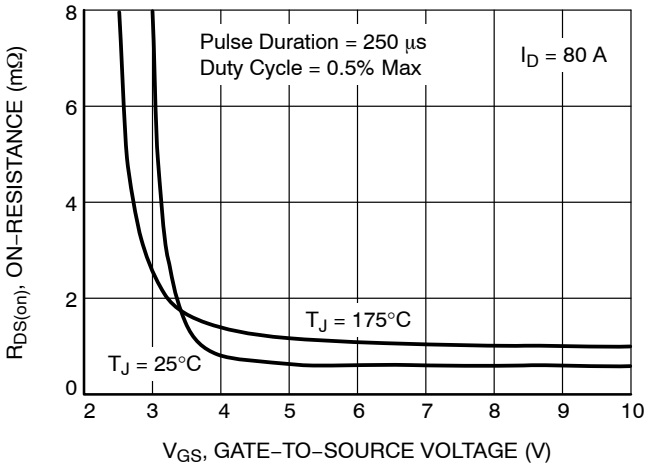


Figure 11. $R_{DS(on)}$ vs. Gate Voltage

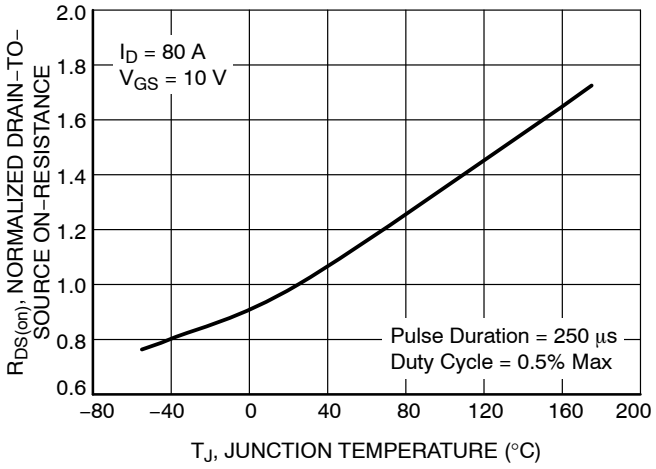


Figure 12. Normalized $R_{DS(on)}$ vs. Junction Temperature

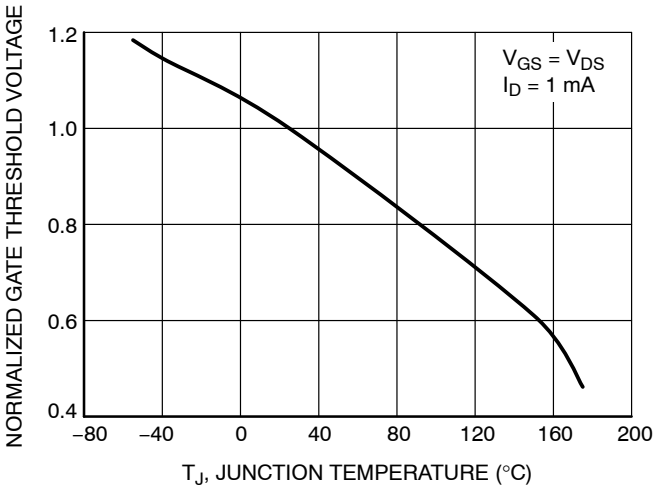


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

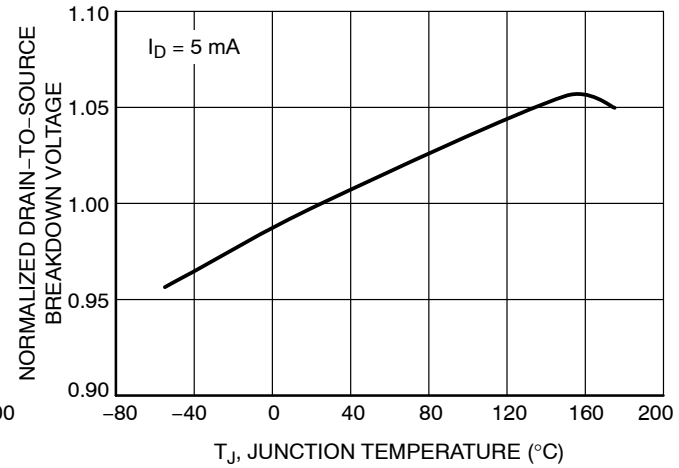


Figure 14. Normalized Drain−to−Source Breakdown Voltage vs. Junction Temperature

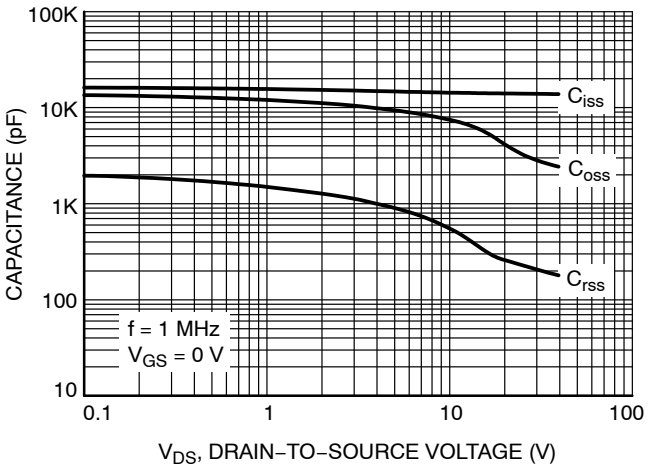


Figure 15. Capacitance vs. Drain−to−Source Voltage

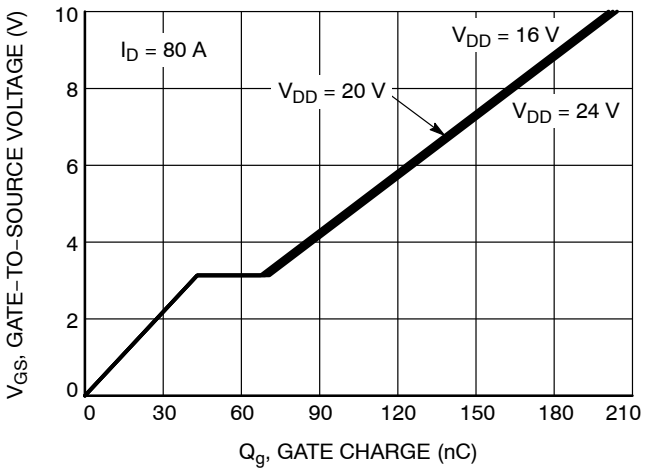
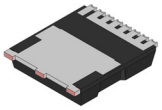


Figure 16. Gate Charge vs. Gate−to−Source Voltage

PACKAGE MARKING AND ORDERING INFORMATION

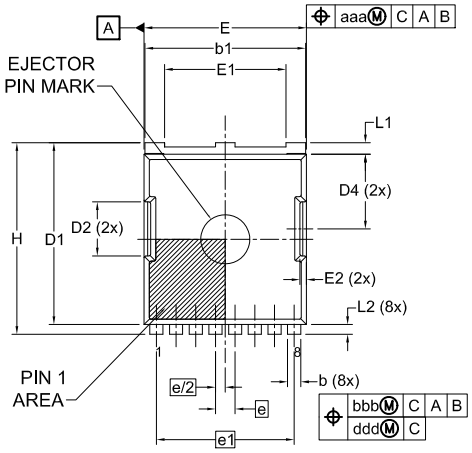
Device	Marking	Package	Reel Size	Tape Width	Quantity
FDBL9403L−F085	FDBL9403L	H−PSOF8L (Pb-Free / Halogen Free)	13″	24 mm	2000 Units

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

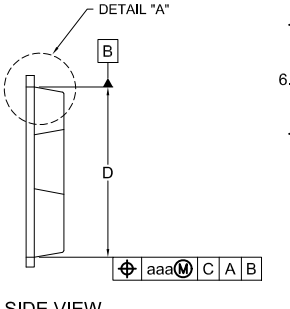


H−PSOF8L 11.68x9.80
CASE 100CU
ISSUE C

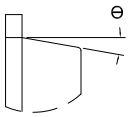
DATE 22 MAY 2023



TOP VIEW



SIDE VIEW



DETAIL "A"
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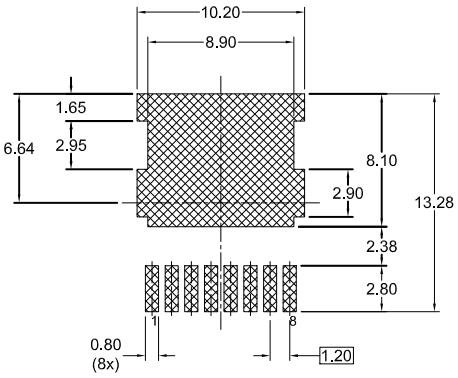
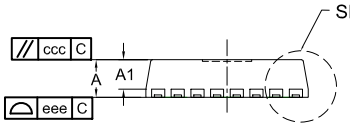
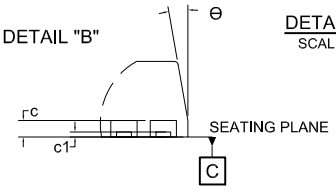


LAND PATTERN
RECOMMENDATION

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



FRONT VIEW



DETAIL "B"
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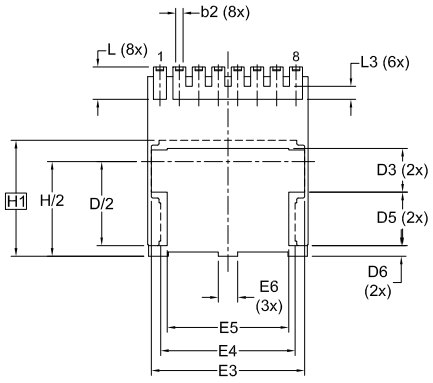


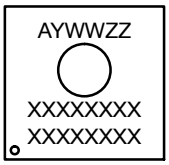
BOTTOM VIEW

NOTES:
1. PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE A.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
3. CONTROLLING DIMENSION: MILLIMETERS.
4. COPLANARITY APPLIES TO THE EXPOSED WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
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	2.20	2.30	2.40
A1	1.70	1.80	1.90
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.35	0.45	0.55
c	0.40	0.50	0.60
c1	0.10	—	—
D	10.28	10.38	10.48
D/2	5.09	5.19	5.29
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3	2.60	2.70	2.80
D4	4.45	4.55	4.65
D5	3.20	3.30	3.40
D6	0.55	0.65	0.75
E	9.80	9.90	10.00
E1	7.30	7.40	7.50
E2	0.30	0.40	0.50
E3	9.36	9.46	9.56

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
E4	8.20	8.30	8.40
E5	7.40	7.50	7.60
E6	1.10	1.20	1.30
e	1.20 BSC		
e/2	0.60 BSC		
e1	8.40 BSC		
H	11.58	11.68	11.78
H/2	5.74	5.84	5.94
H1	7.15 BSC		
L	1.90	2.00	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	0.70	0.80	0.90
Θ	0°	—	12°
aaa	0.20		
bbb	0.25		
ccc	0.20		
ddd	0.20		
eee	0.10		

GENERIC MARKING DIAGRAM*



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

*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.

DOCUMENT NUMBER:	**98AON13813G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**H−PSOF8L 11.68x9.80**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
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