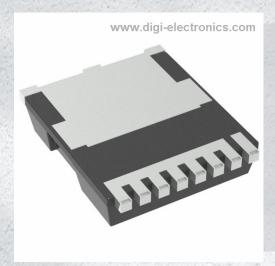


## FDBL9401L-F085 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number FDBL9401L-F085-DG

Manufacturer onsemi

Manufacturer Product Number FDBL9401L-F085

Description MOSFET N-CH 40V 300A 8HPSOF

Detailed Description N-Channel 40 V 300A (Tc) 429W (Tc) Surface Mount

8-HPSO



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:	Manufacturer:
FDBL9401L-F085	onsemi
Series:	Product Status:
PowerTrench®	Obsolete
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
40 V	300A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
4.5V, 10V	0.55mOhm @ 80A, 10V
Vgs(th) (Max) @ ld:	Gate Charge (Qg) (Max) @ Vgs:
3V @ 250μA	376 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	19550 pF @ 20 V
FET Feature:	Power Dissipation (Max):
	429W (Tc)
Operating Temperature:	Grade:
-55°C ~ 175°C (TJ)	Automotive
Qualification:	Mounting Type:
AEC-Q101	Surface Mount
Supplier Device Package:	Package / Case:
8-HPSOF	8-PowerSFN
Base Product Number:	
FDBL9401	

## **Environmental & Export classification**

8541.29.0095

RoHS Status:	Moisture Sensitivity Level (MSL):
RoHS non-compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	

# N-Channel Logic Level PowerTrench® MOSFET

40 V, 300 A, 0.55 m $\Omega$ 

#### **Features**

- Typical  $R_{DS(on)} = 0.47 \text{ m}\Omega$  at  $V_{GS} = 10 \text{ V}$ ,  $I_D = 80 \text{ A}$
- Typical  $Q_{g(tot)} = 269 \text{ nC}$  at  $V_{GS} = 10 \text{ V}$ ,  $I_D = 80 \text{ A}$
- UIS Capability
- Qualified to AEC Q101
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

#### **Applications**

- Automotive Engine Control
- PowerTrain Management
- Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12 V Systems

#### **MAXIMUM RATINGS** (T<sub>A</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>DSS</sub>	Drain-to-Source Voltage	40	V
$V_{GS}$	Gate-to-Source Voltage	±20	V
I <sub>D</sub>	Drain Current – Continuous, $(V_{GS} = 10 \text{ V}) T_C = 25^{\circ}\text{C} \text{ (Note 1)}$	300	Α
	Pulsed Drain Current, T <sub>C</sub> = 25°C	(See Figure 4)	Α
E <sub>AS</sub>	Single Pulse Avalanche Energy (Note 2)	913	mJ
P <sub>D</sub>	Power Dissipation	429	W
	Derate Above 25°C	2.86	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature	–55 to +175	°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.

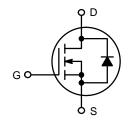
- 1. Current is limited by bondwire configuration.
- 2. Starting  $T_J = 25^{\circ}C$ ,  $L = 530 \mu H$ ,  $I_{AS} = 64 A$ ,  $V_{DD} = 40 V$  during inductor charging and  $V_{DD} = 0 V$  during time in avalanche.



#### ON Semiconductor®

#### www.onsemi.com

V <sub>DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX
40 V	$0.55~\mathrm{m}\Omega$ @ 10 V	300 A

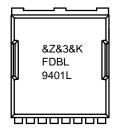


**N-CHANNEL MOSFET** 



H-PSOF8L CASE 100CU

#### **MARKING DIAGRAM**



&Z = Assembly Plant Code &3 = Numeric Date Code

&K = Lot Code

FDBL9401L = Specific Device Code

#### **ORDERING INFORMATION**

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

#### THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{ heta JC}$	Thermal Resistance, Junction to Case	0.35	°C/W
$R_{ heta JA}$	Thermal Resistance, Junction to Ambient (Note 3)	43	

R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design, while R<sub>θJA</sub> is determined by the board design. The maximum rating presented here is based on mounting on a 1 in<sup>2</sup> pad of 2 oz copper.

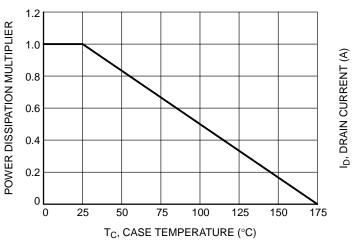
#### **ELECTRICAL CHARACTERISTICS** (T<sub>J</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Тур	Max	Unit
OFF CHARA	ACTERISTICS		•	•	•	
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V	40	-	_	V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	$V_{DS} = 40 \text{ V}, V_{GS} = 0 \text{ V}$ $T_{J} = 25^{\circ}\text{C}$ $T_{J} = 175^{\circ}\text{C (Note 4)}$	_ _	_ _	1 2000	μΑ
I <sub>GSS</sub>	Gate-to-Source Leakage Current	V <sub>GS</sub> = ±20 V	-	_	±100	nA
ON CHARA	CTERISTICS					
V <sub>GS(th)</sub>	Gate-to-Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	1	1.7	3	V
R <sub>DS(on)</sub>	Drain-to-Source On Resistance	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 80 A	-	0.59	0.76	mΩ
		$V_{GS} = 10 \text{ V}, I_D = 80 \text{ A}$ $T_J = 25^{\circ}\text{C}$ $T_J = 175^{\circ}\text{C (Note 4)}$	_ _	0.47 0.81	0.55 0.97	mΩ
DYNAMIC C	HARACTERISTICS					
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	19550	_	pF
C <sub>oss</sub>	Output Capacitance		_	5630	_	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		_	509	_	pF
R <sub>g</sub>	Gate Resistance	V <sub>GS</sub> = 0.5 V, f = 1 MHz	_	2.8	_	Ω
Q <sub>g(tot)</sub>	Total Gate Charge at 10 V	V <sub>GS</sub> = 0 V to 10 V, V <sub>DD</sub> = 32 V, I <sub>D</sub> = 80 A	_	269	376	nC
Q <sub>g(th)</sub>	Threshold Gate Charge	V <sub>GS</sub> = 0 V to 1 V, V <sub>DD</sub> = 32 V, I <sub>D</sub> = 80 A	_	17	_	nC
Q <sub>gs</sub>	Gate-to-Source Gate Charge	V <sub>DD</sub> = 32 V, I <sub>D</sub> = 80 A	-	56	-	nC
$Q_{gd}$	Gate-to-Drain "Miller" Charge	V <sub>DD</sub> = 32 V, I <sub>D</sub> = 80 A	_	33	_	nC
SWITCHING	CHARACTERISTICS					
t <sub>on</sub>	Turn-On Time	$V_{DD} = 20 \text{ V}, I_D = 80 \text{ A}, V_{GS} = 10 \text{ V},$	-	_	150	ns
t <sub>d(on)</sub>	Turn-On Delay Time	$R_{GEN} = 6 \Omega$	_	27	-	ns
t <sub>r</sub>	Turn-On Rise Time		_	49	-	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		_	196	-	ns
t <sub>f</sub>	Turn-Off Fall Time	7	_	79	-	ns
t <sub>off</sub>	Turn-Off Time		_	_	412	ns
DRAIN-SOU	RCE DIODE CHARACTERISTICS					
V <sub>SD</sub>	Source-to-Drain Diode Voltage	I <sub>SD</sub> = 80 A, V <sub>GS</sub> = 0 V	_	0.78	1.25	V
		I <sub>SD</sub> = 40 A, V <sub>GS</sub> = 0 V	_	0.74	1	
t <sub>rr</sub>	Reverse–Recovery Time	I <sub>F</sub> = 80 A, dI <sub>SD</sub> /dt = 100 A/μs	-	130	195	ns
Q <sub>rr</sub>	Reverse-Recovery Charge	1	_	270	405	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.

<sup>4.</sup> The maximum value is specified by design at T<sub>J</sub> = 175°C. Product is not tested to this condition in production.

#### **TYPICAL CHARACTERISTICS**



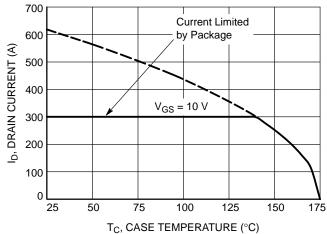


Figure 1. Normalized Power Dissipation vs.

Case Temperature

Figure 2. Maximum Continuous Drain Current vs. Case Temperature

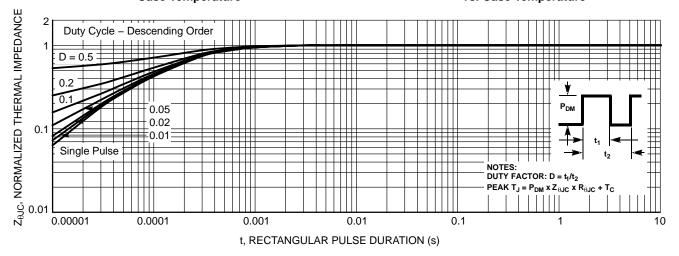


Figure 3. Normalized Maximum Transient Thermal Impedance

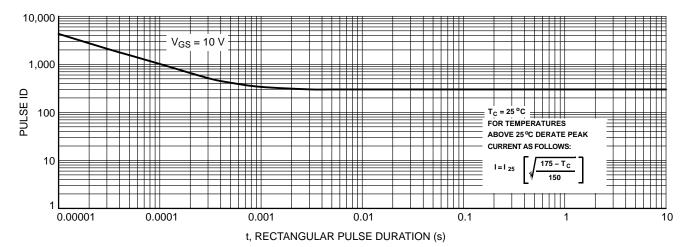


Figure 4. Peak Current Capability

#### TYPICAL CHARACTERISTICS

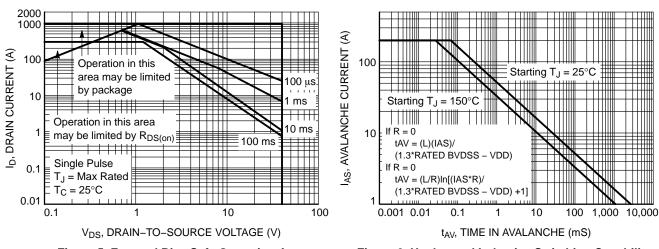


Figure 5. Forward Bias Safe Operating Area

Figure 6. Unclamped Inductive Switching Capability

Note: Refer to ON Semiconductor Application Notes AN7514 and AN7515

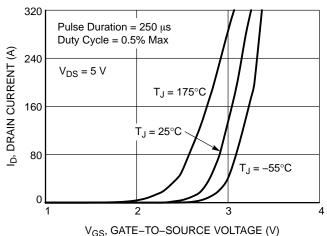
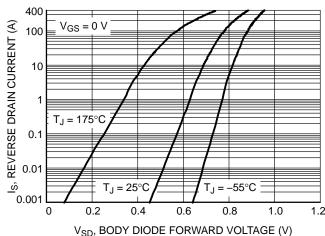


Figure 7. Transfer Characteristics



**Figure 8. Forward Diode Characteristics** 

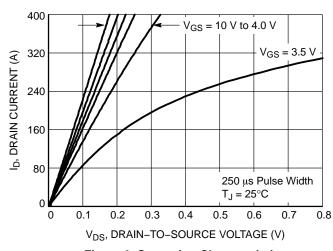


Figure 9. Saturation Characteristics

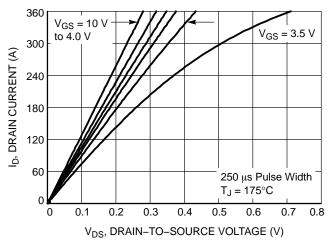
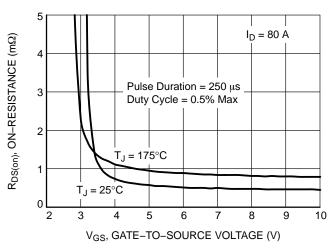


Figure 10. Saturation Characteristics

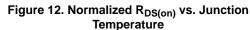
#### TYPICAL CHARACTERISTICS

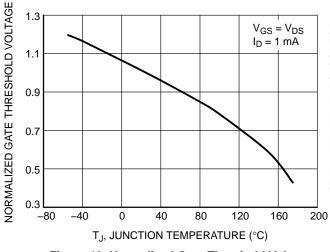


1.8
| OL NIEW | 1.6 | VGS = 10 V | VGS = 10

 $\mathsf{T}_\mathsf{J}$ , JUNCTION TEMPERATURE (°C)

Figure 11. R<sub>DS(on)</sub> vs. Gate Voltage





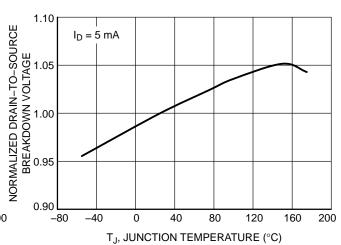
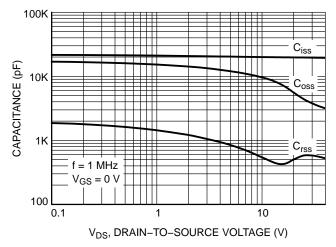


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

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



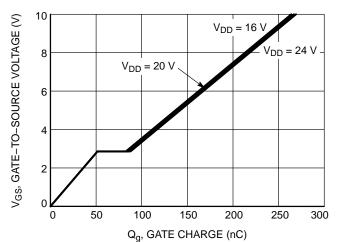


Figure 15. Capacitance vs. Drain-to-Source Voltage

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

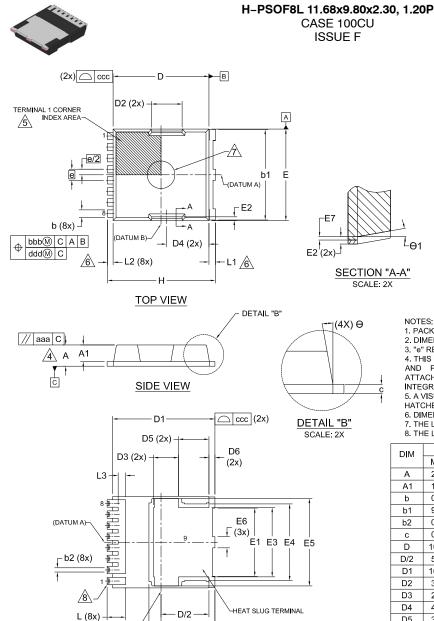
#### PACKAGE MARKING AND ORDERING INFORMATION

Device	Marking	Package	Reel Size	Tape Width	Quantity
FDBL9401L-F085	FDBL9401L	H-PSOF8L (Pb-Free / Halogen Free)	13″	24 mm	2000 Units



## **MECHANICAL CASE OUTLINE**

**PACKAGE DIMENSIONS** 



## **DATE 30 JUL 2024** 6.64 0.80 (2X) 4.20 10.20 8.00 4.60 2.80 8 10

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

LAND PATTERN

#### NOTES:

HATCHED AREA

- 1. PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE B.
- 2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
- 3. "e" REPRESENTS THE TERMINAL PITCH.
- 4. THIS DIMENSION INCLUDES ENCAPSULATION THICKNESS "A1", AND PACKAGE BODY THICKNESS, BUT DOES NOT INCLUDE ATTACHED FEATURES, e.g., EXTERNAL OR CHIP CAPACITORS. AN INTEGRAL HEATSLUG IS NOT CONSIDERED AS ATTACHED FEATURE. 5. A VISUAL INDEX FEATURE MUST BE LOCATED WITHIN THE
- 6. DIMENSIONS b1,L1,L2 APPLY TO PLATED TERMINALS.

2.38

- 7. THE LOCATION AND SIZE OF EJECTOR MARKS ARE OPTIONAL.
  8. THE LOCATION AND NUMBER OF FUSED LEADS ARE OPTIONAL.

DIM	MILLIMETERS			
Divi	MIN.	NOM.	MAX.	
Α	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	
С	0.40	0.50	0.60	
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	7.40	7.50	7.60	
E4	8.20	8.30	8.40	

DIM	MILLIMETERS		
Dim	MIN.	NOM.	MAX.
E5	9.36	9.46	9.56
E6	1.10	1.20	1.30
E7	0.15	0.18	0.21
е		1.20 BSC	;
e/2	1	0.60 BSC	;
Н	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		10° REF	
Θ1	10° REF		
aaa	0.20		
bbb	0.25		
ccc		0.20	
ddd	0.20		
eee	0.10		

#### **BOTTOM VIEW GENERIC MARKING DIAGRAM\***

Α = Assembly Location

= Year

(DATUM B)

WW = Work Week

= Assembly Lot Code

XXXX = Specific Device Code

AYWWZZ XXXXXXX XXXXXXX

\*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:	H-PSOF8L 11.68x9.80x2.30, 1.20P		PAGE 1 OF 1	

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