

FDD86381-F085 Datasheet



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DiGi Electronics Part Number	FDD86381-F085-DG
Manufacturer	onsemi
Manufacturer Product Number	FDD86381-F085
Description	MOSFET N-CH 80V 25A DPAK
Detailed Description	N-Channel 80 V 25A (Tc) 48.4W (Tj) Surface Mount T O-252AA



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Purchase and inquiry

Manufacturer Product Number:

FDD86381-F085

Series:

PowerTrench®

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

80 V

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

10V

Vgs(th) (Max) @ Id:

4V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 175°C (Tj)

Qualification:

AEC-Q101

Supplier Device Package:

TO-252AA

Base Product Number:

FDD86381

Manufacturer:

onsemi

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

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

25A (Tc)

Rds On (Max) @ Id, Vgs:

21mOhm @ 25A, 10V

Gate Charge (Qg) (Max) @ Vgs:

21 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

866 pF @ 40 V

Power Dissipation (Max):

48.4W (Tj)

Grade:

Automotive

Mounting Type:

Surface Mount

Package / Case:

TO-252-3, DPAK (2 Leads + Tab), SC-63

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

ON Semiconductor

Is Now

The logo for onsemi, featuring the word "onsemi" in a dark teal, lowercase, sans-serif font. The letter "i" is stylized with a white dot and a teal vertical bar. A small orange triangle is positioned above the top right of the "i". A trademark symbol (TM) is located to the right of the logo.

To learn more about onsemi™, please visit our website at
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FDD86381-F085

N-Channel PowerTrench® MOSFET

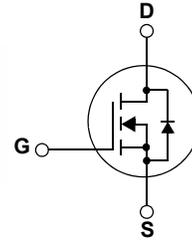
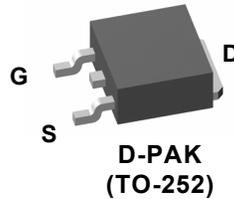
80 V, 25 A, 21 mΩ

Features

- Typical $R_{DS(on)}$ = 16.2 mΩ at $V_{GS} = 10V$, $I_D = 25 A$
- Typical $Q_{g(tot)}$ = 14 nC at $V_{GS} = 10V$, $I_D = 25 A$
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

Applications

- Automotive Engine Control
- PowerTrain Management
- Solenoid and Motor Drivers
- Electronic Steering
- Integrated Starter/Alternator
- Distributed Power Architectures and VRM
- Primary Switch for 12V Systems



MOSFET Maximum Ratings $T_J = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-to-Source Voltage	80	V
V_{GS}	Gate-to-Source Voltage	±20	V
I_D	Drain Current - Continuous ($V_{GS}=10$) (Note 1)	$T_C = 25^\circ\text{C}$	25
	Pulsed Drain Current	$T_C = 25^\circ\text{C}$	See Figure 4
E_{AS}	Single Pulse Avalanche Energy (Note 2)	14	mJ
P_D	Power Dissipation	48.4	W
	Derate Above 25°C	0.323	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature	-55 to + 175	$^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.1	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient (Note 3)	52	$^\circ\text{C}/\text{W}$

Notes:

- 1: Current is limited by bondwire configuration.
- 2: Starting $T_J = 25^\circ\text{C}$, $L = 70\mu\text{H}$, $I_{AS} = 20\text{A}$, $V_{DD} = 80\text{V}$ during inductor charging and $V_{DD} = 0\text{V}$ during time in avalanche.
- 3: $R_{\theta JA}$ 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. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2oz copper.

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD86381	FDD86381-F085	D-PAK(TO-252)	13"	16mm	2500units

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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Off Characteristics

$B_{V_{DS}}$	Drain-to-Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	80	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	$V_{DS} = 80\text{V}$, $T_J = 25^\circ\text{C}$	-	-	1	μA
		$V_{GS} = 0\text{V}$, $T_J = 175^\circ\text{C}$ (Note 4)	-	-	1	mA
I_{GSS}	Gate-to-Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$	2.0	2.7	4.0	V
$R_{DS(on)}$	Drain to Source On Resistance	$I_D = 25\text{A}$, $T_J = 25^\circ\text{C}$	-	16.2	21	$\text{m}\Omega$
		$V_{GS} = 10\text{V}$, $T_J = 175^\circ\text{C}$ (Note 4)	-	34.7	45	$\text{m}\Omega$

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$	-	866	-	pF
C_{oss}	Output Capacitance		-	176	-	pF
C_{riss}	Reverse Transfer Capacitance		-	7	-	pF
R_g	Gate Resistance	$V_{GS} = 0.5\text{V}$, $f = 1\text{MHz}$	-	2.3	-	Ω
$Q_{g(ToT)}$	Total Gate Charge	$V_{GS} = 0$ to 10V	-	14	21	nC
$Q_{g(th)}$	Threshold Gate Charge	$V_{GS} = 0$ to 2V				
Q_{gs}	Gate-to-Source Gate Charge	$V_{DD} = 40\text{V}$, $I_D = 25\text{A}$	-	5	-	nC
Q_{gd}	Gate-to-Drain "Miller" Charge		-	4	-	nC

Switching Characteristics

t_{on}	Turn-On Time	$V_{DD} = 40\text{V}$, $I_D = 25\text{A}$, $V_{GS} = 10\text{V}$, $R_{GEN} = 6\Omega$	-	-	25	ns
$t_{d(on)}$	Turn-On Delay		-	8	-	ns
t_r	Rise Time		-	9	-	ns
$t_{d(off)}$	Turn-Off Delay		-	14	-	ns
t_f	Fall Time		-	5	-	ns
t_{off}	Turn-Off Time		-	-	28	ns

Drain-Source Diode Characteristics

V_{SD}	Source-to-Drain Diode Voltage	$I_{SD} = 25\text{A}$, $V_{GS} = 0\text{V}$	-	-	1.25	V
		$I_{SD} = 12.5\text{A}$, $V_{GS} = 0\text{V}$	-	-	1.2	V
t_{rr}	Reverse-Recovery Time	$V_{DD} = 64\text{V}$, $I_F = 25\text{A}$,	-	32	48	ns
Q_{rr}	Reverse-Recovery Charge	$dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	19	29	nC

Note:

4: The maximum value is specified by design at $T_J = 175^\circ\text{C}$. Product is not tested to this condition in production.

Typical Characteristics

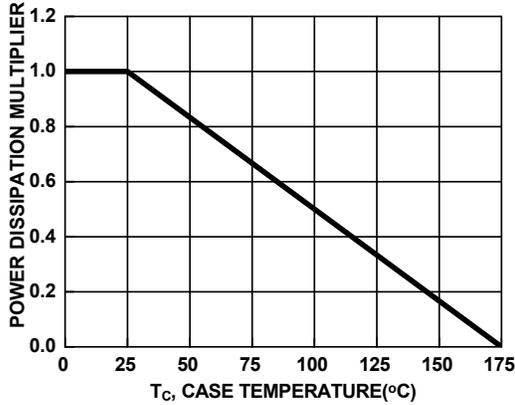


Figure 1. Normalized Power Dissipation vs. Case Temperature

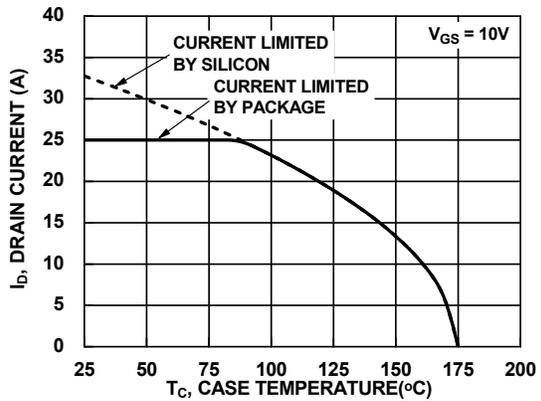


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

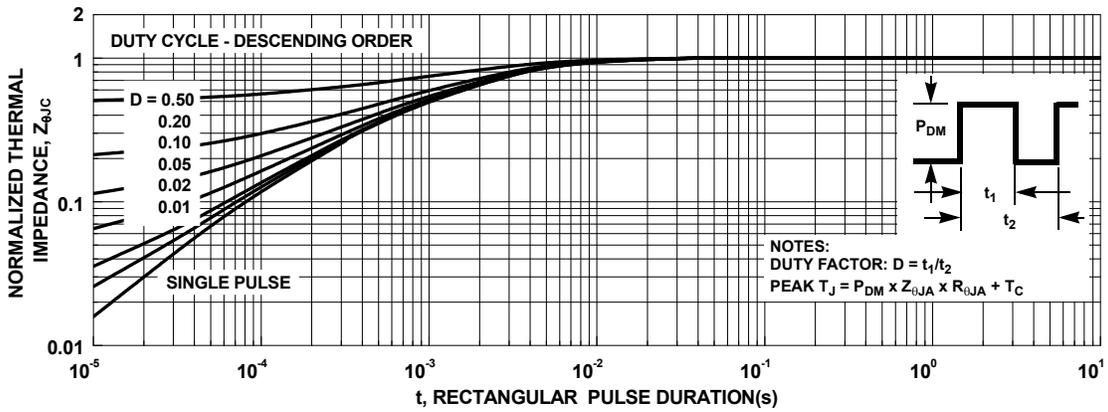


Figure 3. Normalized Maximum Transient Thermal Impedance

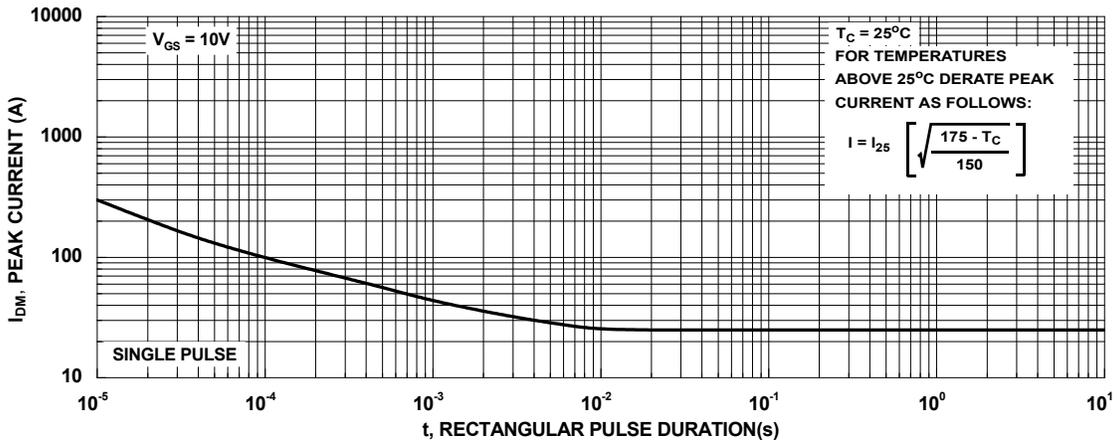


Figure 4. Peak Current Capability

Typical Characteristics

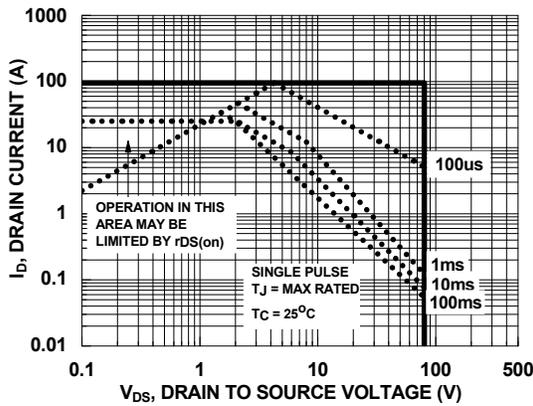
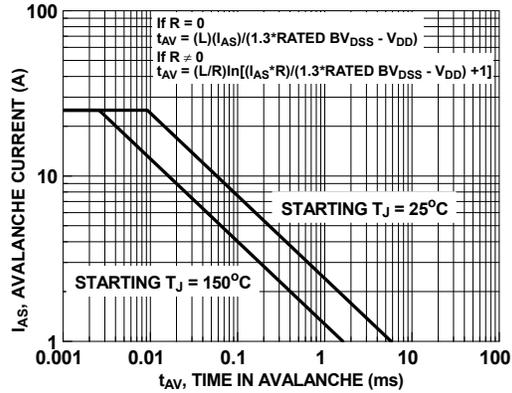


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

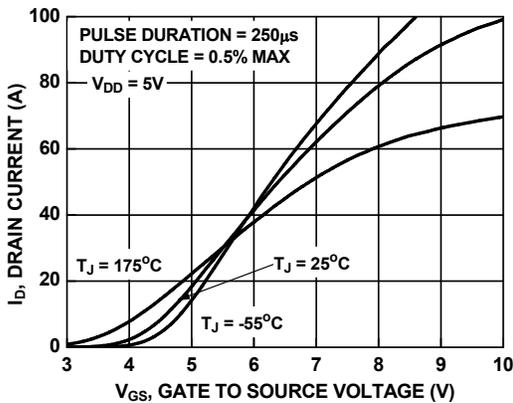


Figure 7. Transfer Characteristics

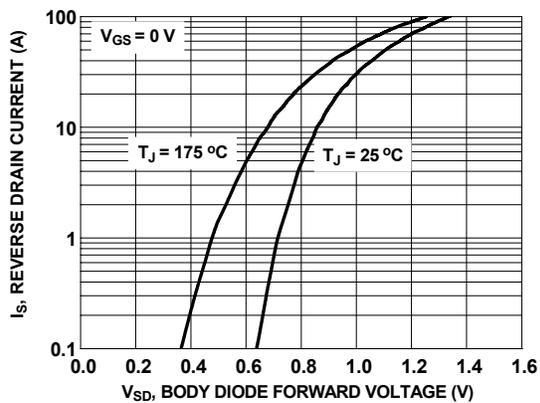


Figure 8. Forward Diode Characteristics

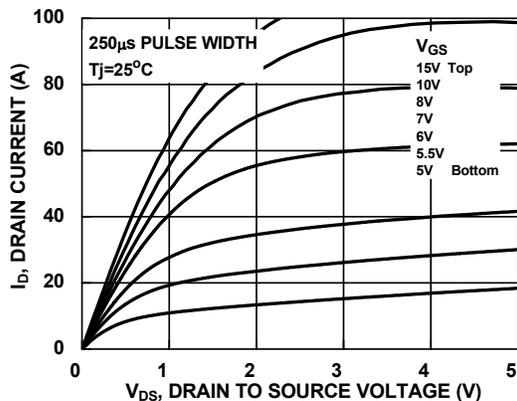


Figure 9. Saturation Characteristics

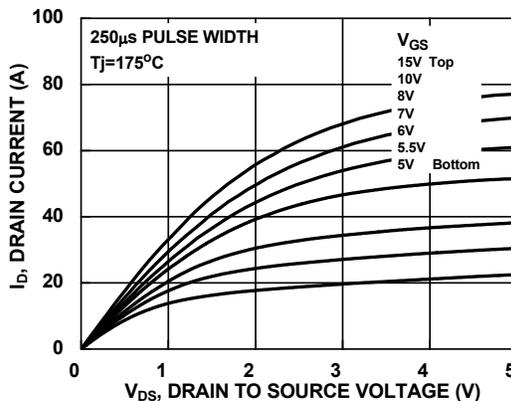


Figure 10. Saturation Characteristics

Typical Characteristics

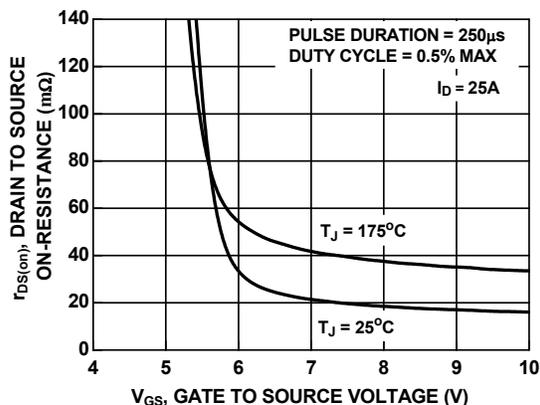


Figure 11. $R_{DS(on)}$ vs. Gate Voltage

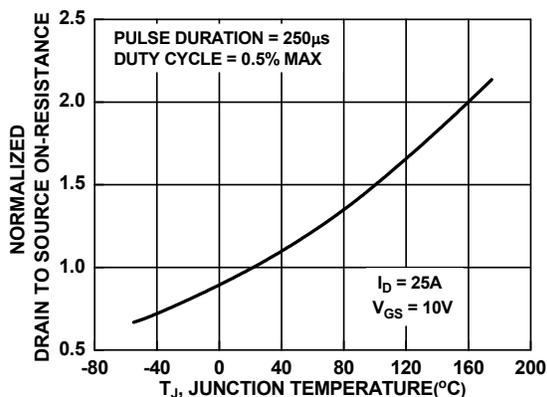


Figure 12. Normalized $R_{DS(on)}$ vs. Junction Temperature

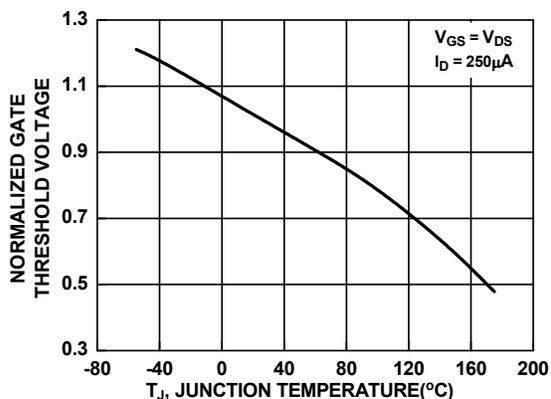


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

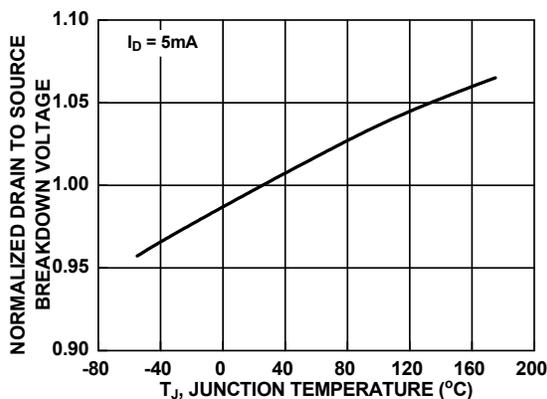


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

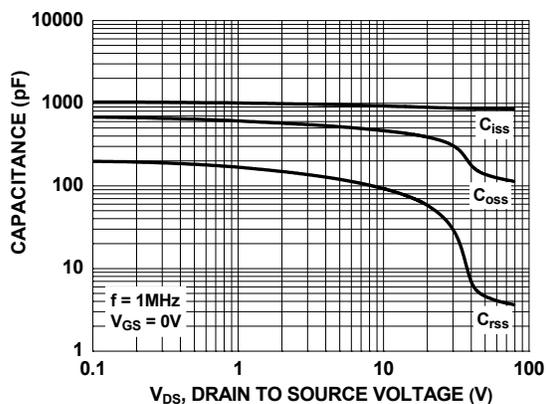


Figure 15. Capacitance vs. Drain to Source Voltage

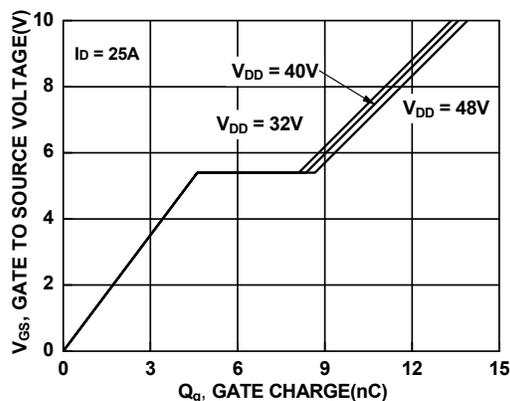


Figure 16. Gate Charge vs. Gate to Source Voltage

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