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ON Semiconductor®

# FDB075N15A-F085

## N-Channel Power Trench® MOSFET

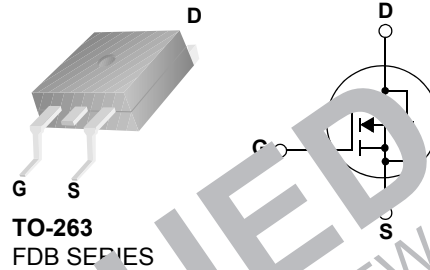
150V, 110A, 7.5mΩ

### Features

- Typ  $r_{DS(on)}$  = 5.5mΩ at  $V_{GS}$  = 10V,  $I_D$  = 80A
- Typ  $Q_{g(tot)}$  = 80nC at  $V_{GS}$  = 10V,  $I_D$  = 80A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

### Applications

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



### MOSFET Maximum Ratings (T<sub>vj</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain to Source Voltage	150	V
$V_{GS}$	Gate to Source Voltage	±20	V
$I_D$	Drain Current - Continuous ( $V_{GS}$ = 10) (Note 1)	110	A
	Drain Current - Pulsed	See Figure 4	
$E_{AS}$	Single Pulse Avalanche Energy (Note 2)	502	mJ
$P_D$	Power Dissipation (Note 3)	333	W
$P_D$	Power Dissipation (Note 3)	2.22	W/°C
$T_J, T_{STG}$	Operating and Storage Temperature	-55 to + 175	°C
$R_{\theta JC}$	Thermal Resistance Junction to Case	0.45	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance Junction to Ambient (Note 3)	43	°C/W

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB075N15A	FDB075N15A-F085	D2-PAK(TO-263)	330mm	24mm	800 units

#### Notes:

- 1: Current is limited by bondwire configuration.
- 2: Starting  $T_J$  = 25°C,  $L$  = 0.24mH,  $I_{AS}$  = 64A,  $V_{DD}$  = 100V during inductor charging and  $V_{DD}$  = 0V 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 user's board design. The maximum rating presented here is based on mounting on a 1 in<sup>2</sup> pad of 2oz copper.

## 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	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	150	-	-	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS} = 150\text{V}, T_J = 25^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$V_{GS} = 0\text{V}, T_J = 175^\circ\text{C}(\text{Note } 4)$	-	-	1	$\text{mA}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	$\text{nA}$

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2.0	3.0	-	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = 80\text{A}, T_J = 25^\circ\text{C}$	-	5.5	7.5	$\text{m}\Omega$
		$V_{GS} = 10\text{V}, T_J = 175^\circ\text{C}(\text{Note } 4)$	-	14.2	20	$\text{m}\Omega$

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 75\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	-	595	-	$\text{pF}$
$C_{oss}$	Output Capacitance		-	51	-	$\text{pF}$
$C_{rss}$	Reverse Transfer Capacitance		-	46	-	$\text{pF}$
$R_g$	Gate Resistance	$f = 1\text{MHz}$	-	2.4	-	$\Omega$
$Q_{g(ToT)}$	Total Gate Charge at 10V	$V_{GS} = 10\text{V to } 10\text{V}$	-	80	95	$\text{nC}$
$Q_{g(th)}$	Threshold Gate Charge	$V_{GS} = 10\text{ to } 2\text{V}$	-	1	13	$\text{nC}$
$Q_{gs}$	Gate to Source Gate Charge	$I_D = 75\text{A}$	-	26.5	-	$\text{nC}$
$Q_{gd}$	Gate to Drain "Miller" Charge	$I_D = 80\text{A}$	-	14	-	$\text{nC}$

### Switching Characteristics

$t_{on}$	Turn-On Time		-	-	100	$\text{ns}$
$t_{d(on)}$	Turn-On Delay Time		-	33	-	$\text{ns}$
$t_r$	Rise Time	$V_{DD} = 75\text{V}, I_D = 80\text{A}$	-	46	-	$\text{ns}$
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS} = 10\text{V}, R_{GEN} = 6\Omega$	-	76	-	$\text{ns}$
$t_{fall}$	Fall Time		-	25	-	$\text{ns}$
$t_{off}$	Turn-Off Time		-	-	138	$\text{ns}$

### Drain-Source Diode Characteristics

$V_{SD}$	Source to Drain Diode Voltage	$I_{SD} = 80\text{A}, V_{GS} = 0\text{V}$	-	-	1.25	V
		$I_{SD} = 40\text{A}, V_{GS} = 0\text{V}$	-	-	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 80\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	118	132	$\text{ns}$
$Q_{rr}$	Reverse Recovery Charge	$V_{DD} = 120\text{V}$	-	341	494	$\text{nC}$

#### Notes:

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

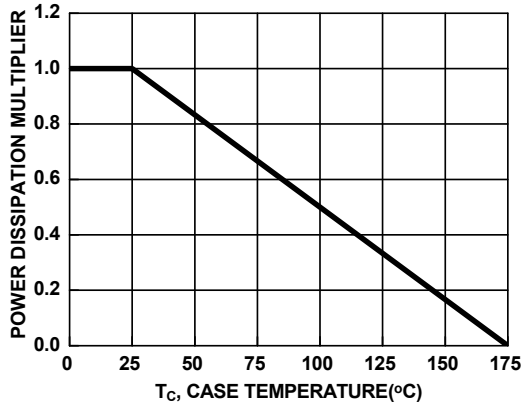


Figure 1. Normalized Power Dissipation vs Case Temperature

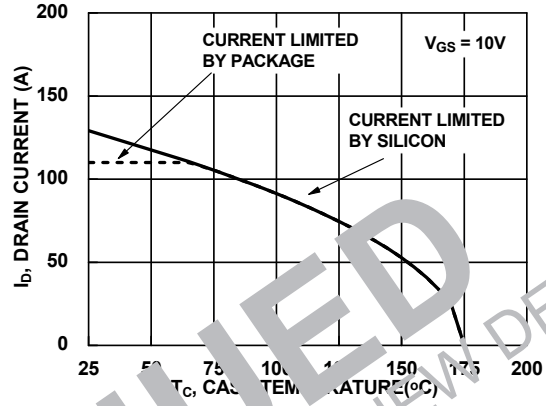


Figure 2. Maximum Continuous Drain Current vs Case Temperature

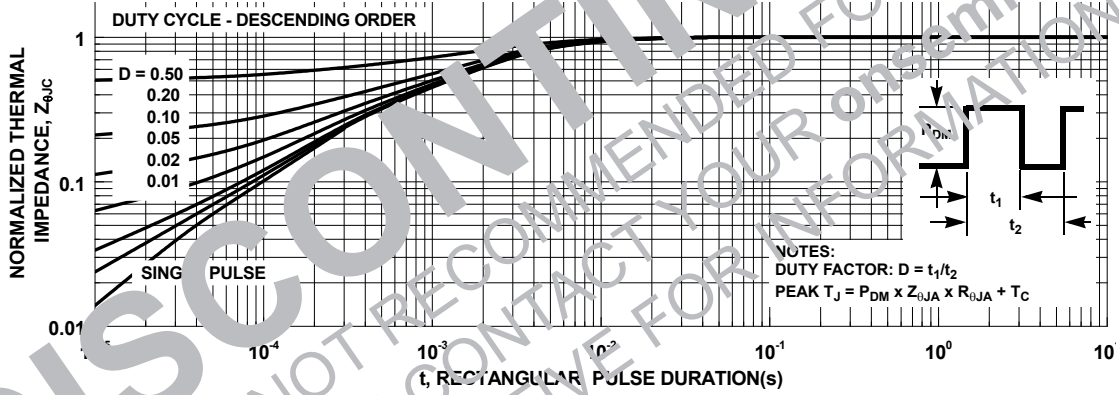


Figure 3. Normalized Maximum Transient Thermal Impedance

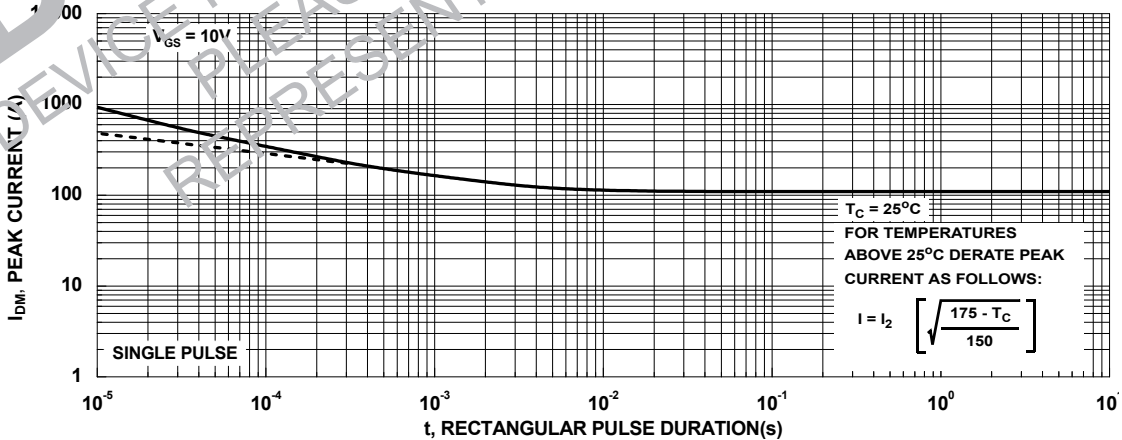


Figure 4. Peak Current Capability

### Typical Characteristics

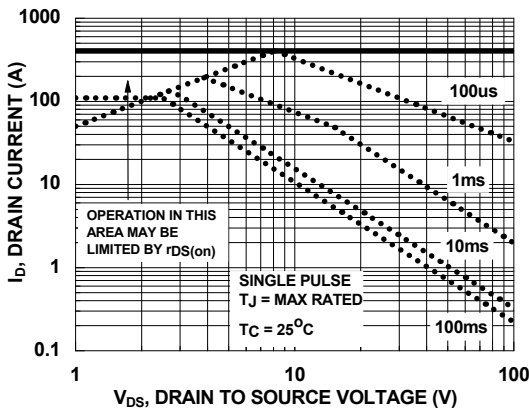


Figure 5. Forward Bias Safe Operating Area

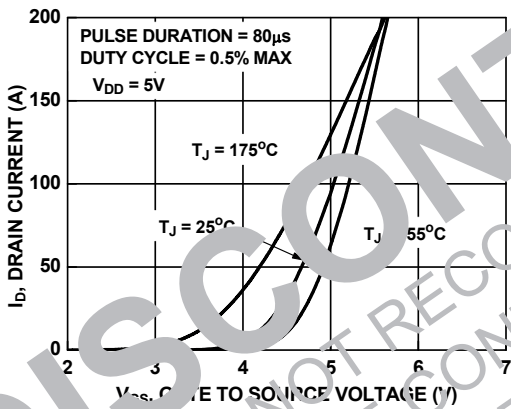
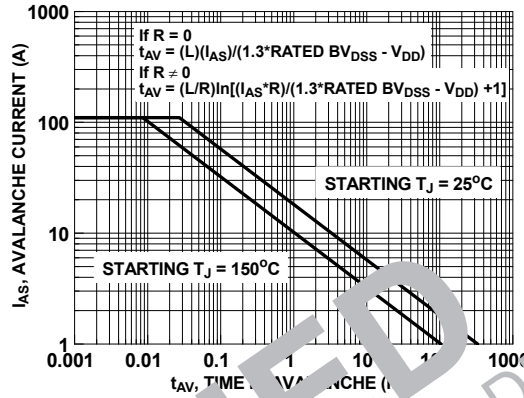


Figure 7. Transfer Characteristics

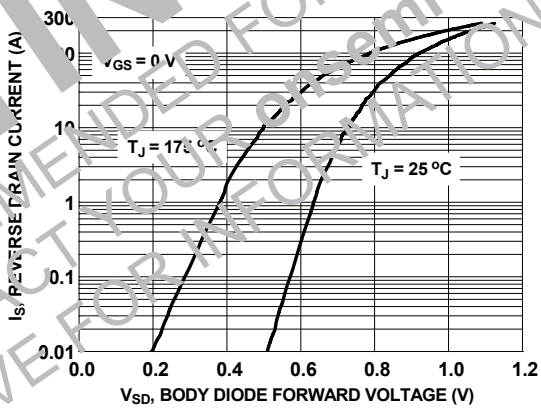


Figure 8. Forward Diode Characteristics

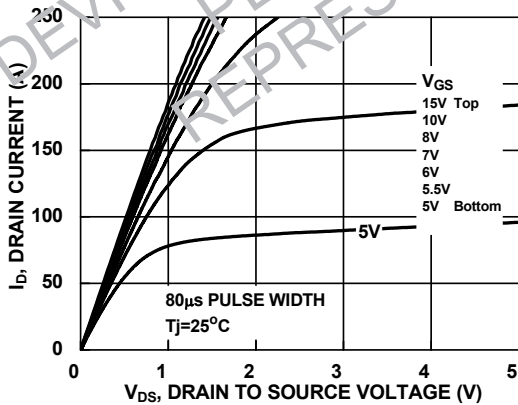


Figure 9. Saturation Characteristics

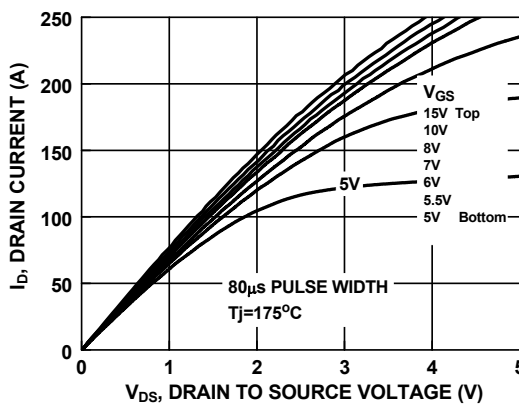


Figure 10. Saturation Characteristics

### Typical Characteristics

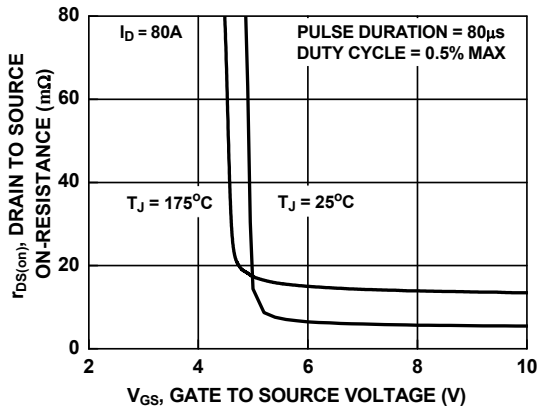


Figure 11.  $R_{dson}$  vs Gate Voltage

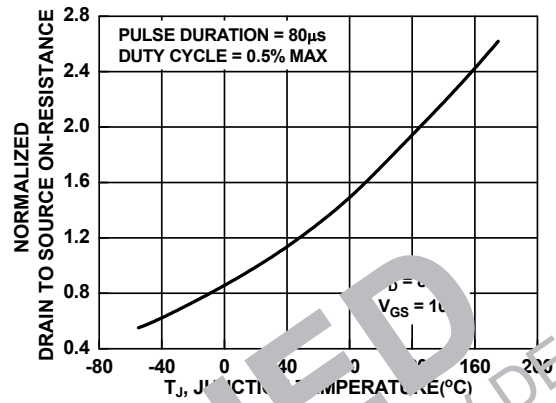


Figure 12. Normalized  $R_{dson}$  vs Junction Temperature

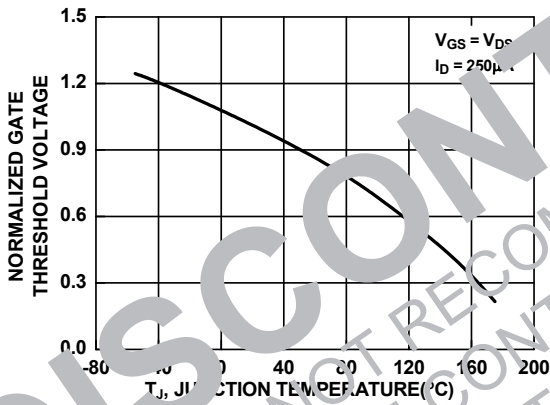


Figure 13. Normalized Gate Threshold Voltage vs Junction Temperature

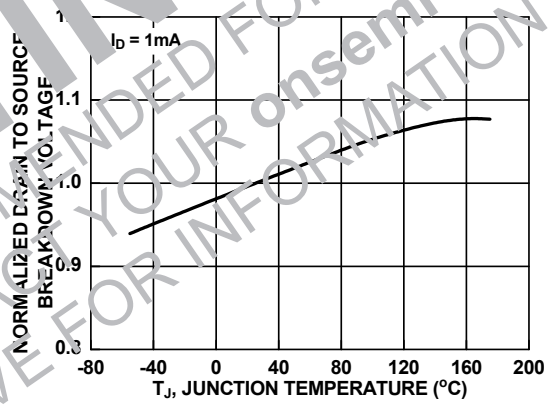


Figure 14. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

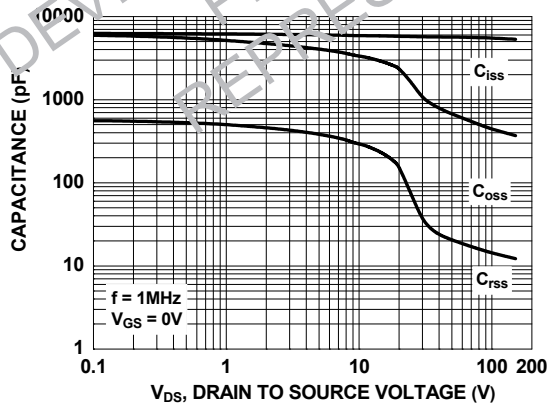


Figure 15. Capacitance vs Drain to Source Voltage

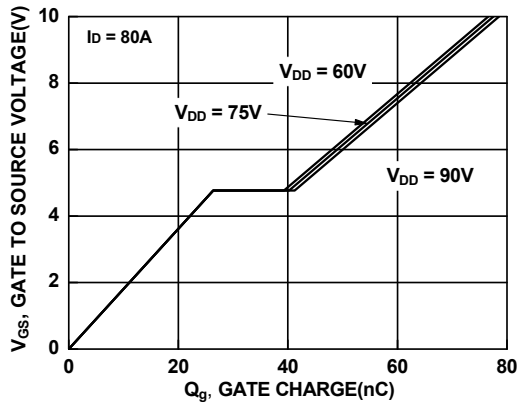



Figure 16. Gate Charge vs Gate to Source Voltage

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