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November 2015

# FDBL0240N100

## N-Channel PowerTrench<sup>®</sup> MOSFET

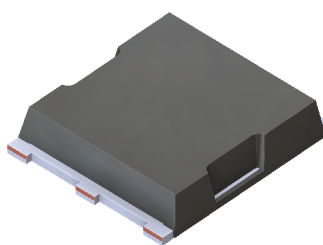
100 V, 210 A, 2.8 mΩ

### Features

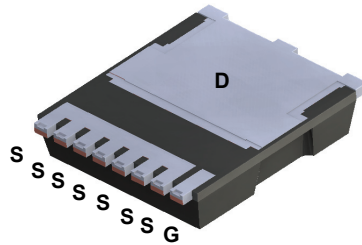
- Max  $R_{DS(on)}$  = 2.8 mΩ at  $V_{GS} = 10\text{ V}$ ,  $I_D = 80\text{ A}$
- Max  $Q_{g(tot)}$  = 111 nC at  $V_{GS} = 10\text{ V}$ ,  $I_D = 80\text{ A}$
- UIS Capability
- RoHS Compliant

### Applications

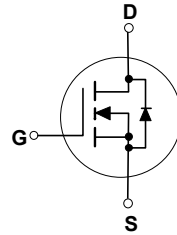
- Industrial Motor Drive
- Industrial Power Supply
- Industrial Automation
- Battery Operated tools
- Battery Protection
- Solar Inverters
- UPS and Energy Inverters
- Energy Storage
- Load Switch



TOP



BOTTOM



MO-299A

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

Symbol	Parameter	Rated	Units
$V_{DS}$	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)	210	A
	-Continuous $T_C = 100^\circ\text{C}$ (Note 5)	150	
	-Pulsed (Note 4)	910	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	821	mJ
$P_D$	Power Dissipation $T_C = 25^\circ\text{C}$	300	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	3.5	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +175	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	0.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	43	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDBL0240N100	FDBL0240N100	MO-299A	-	-	-

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

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

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}, V_{GS} = 0\text{ V}$	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$		58		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			$\pm 100$	nA

#### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	2	2.9	4	V
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 80\text{ A}$		2.2	2.8	m $\Omega$
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$		-13		mV/ $^\circ\text{C}$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 80\text{ A}$		162		S

#### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$		5835	8755	pF
$C_{oss}$	Output Capacitance			1235	1855	pF
$C_{rss}$	Reverse Transfer Capacitance			41	65	pF
$R_g$	Gate Resistance	$V_{GS} = 0.5\text{ V}, f = 1\text{ MHz}$		2.5		$\Omega$

#### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{ V}, I_D = 80\text{ A},$ $V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$		26	42	ns
$t_r$	Rise Time			32	51	ns
$t_{d(off)}$	Turn-Off Delay Time			44	70	ns
$t_f$	Fall Time			17	30	ns
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{ to }10\text{ V}$	$V_{DD} = 50\text{ V},$ $I_D = 80\text{ A}$	79	111	nC
$Q_{g(th)}$	Threshold Gate Charge	$V_{GS} = 0\text{ to }2\text{ V}$		11	15	nC
$Q_{gs}$	Gate to Source Gate Charge			27		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			16		nC

#### Drain-Source Diode Characteristics

$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	210	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	910	A
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 80\text{ A}$ (Note 2)		0.8	1.3	V
		$V_{GS} = 0\text{ V}, I_S = 40\text{ A}$ (Note 2)		0.8	1.2	
$t_{rr}$	Reverse Recovery Time	$I_F = 80\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		82	131	ns
$Q_{rr}$	Reverse Recovery Charge			151	242	nC

#### Notes:

1.  $R_{\theta JA}$  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  $R_{\theta CA}$  is determined by the user's board design.

a)  $43\text{ }^\circ\text{C}/\text{W}$  when mounted on a  $1\text{ in}^2$  pad of 2 oz copper.

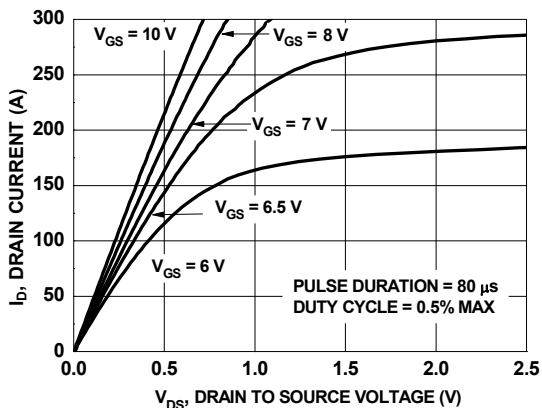
2. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0 %.

3.  $E_{AS}$  of 821 mJ is based on starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 0.3\text{ mH}$ ,  $I_{AS} = 74\text{ A}$ ,  $V_{DD} = 90\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% test at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 106\text{ A}$ .

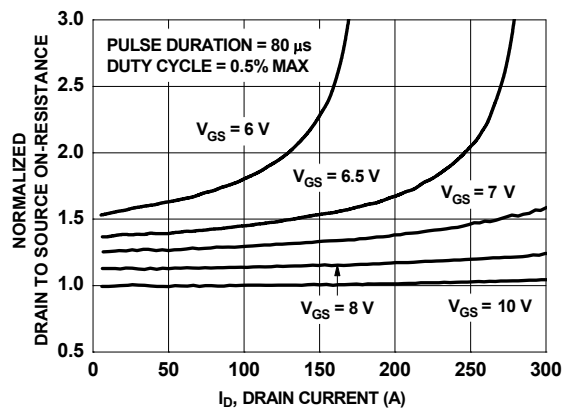
4. Pulsed  $I_D$  please refer to Figure "Forward Bias Safe Operating Area" for more details.

5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

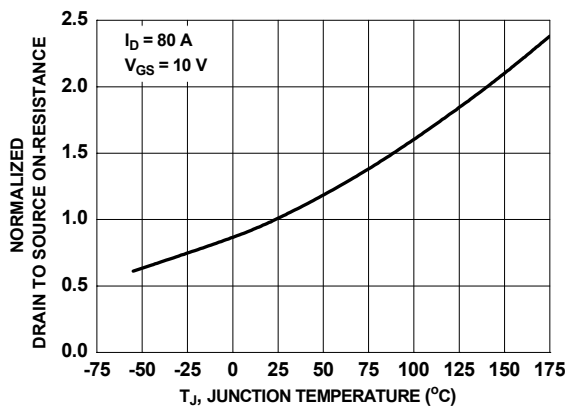
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted.



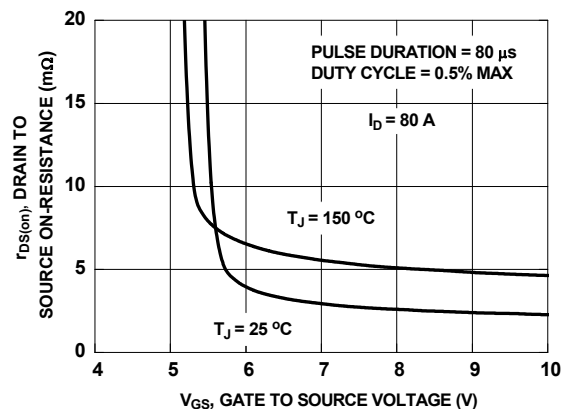
**Figure 1. On Region Characteristics**



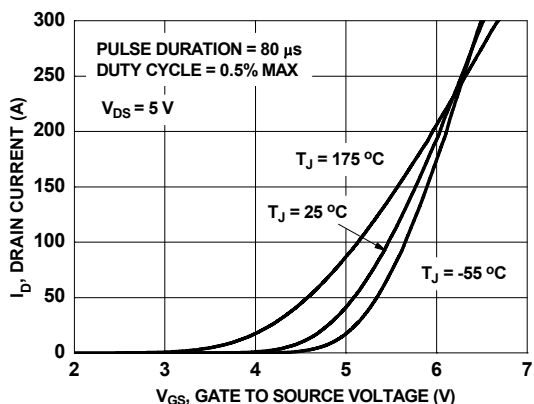
**Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage**



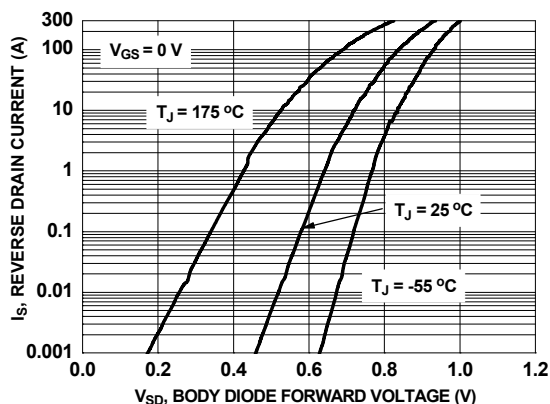
**Figure 3. Normalized On Resistance vs. Junction Temperature**



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

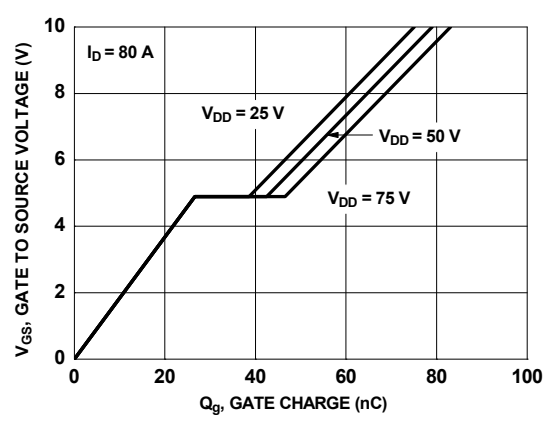


**Figure 5. Transfer Characteristics**

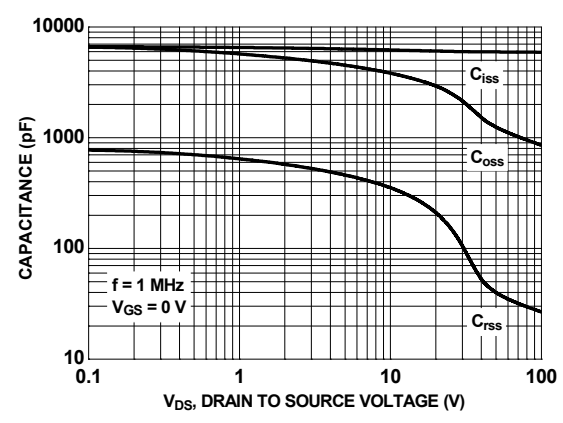


**Figure 6. Source to Drain Diode Forward Voltage vs. Source Current**

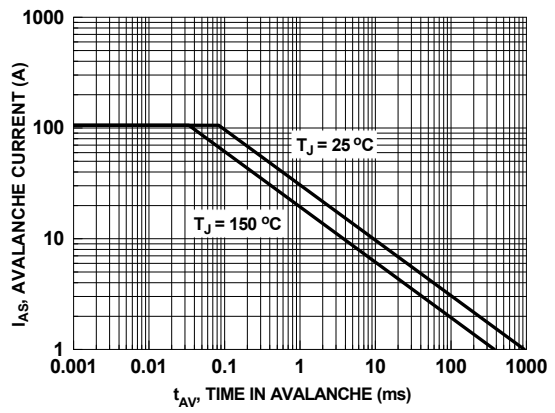
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted.



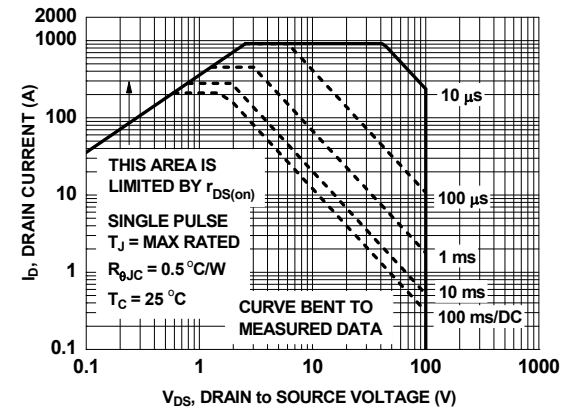
**Figure 7. Gate Charge Characteristics**



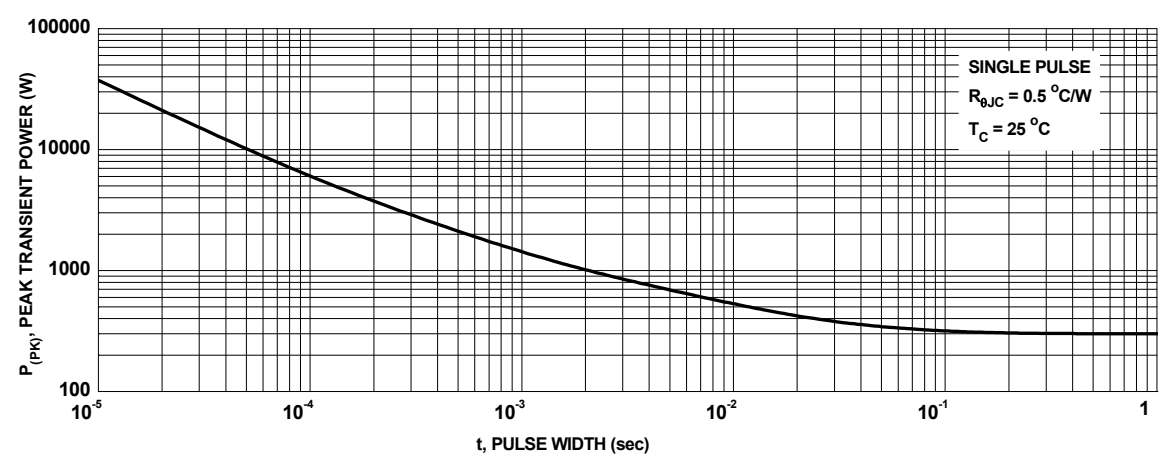
**Figure 8. Capacitance vs. Drain to Source Voltage**



**Figure 9. Unclamped Inductive Switching Capability**

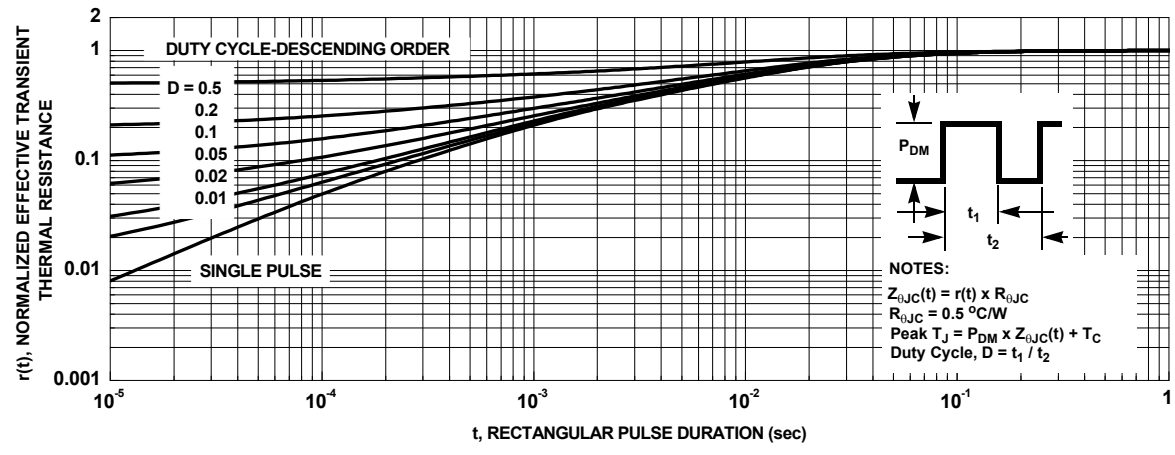


**Figure 10. Forward Bias Safe Operating Area**

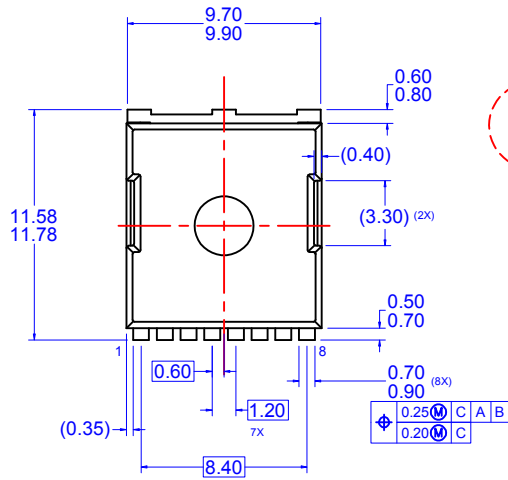


**Figure 11. Single Pulse Maximum Power Dissipation**

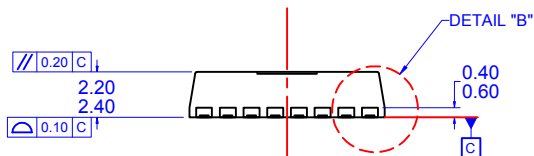
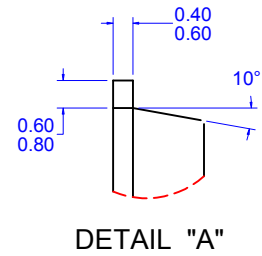
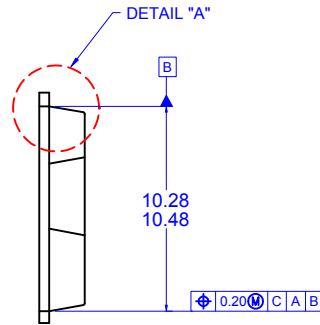
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted.



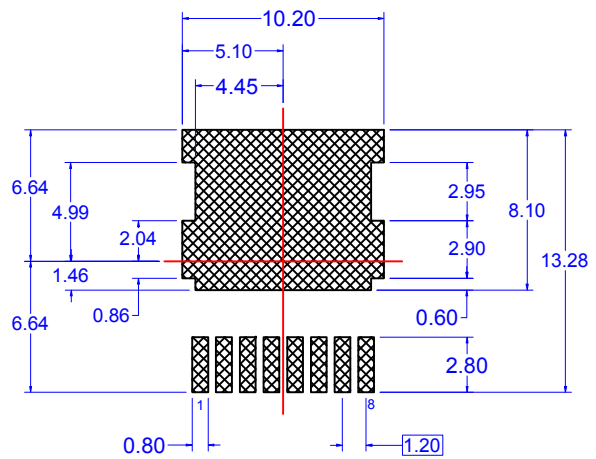
**Figure 12. Junction-to-Case Transient Thermal Response Curve**



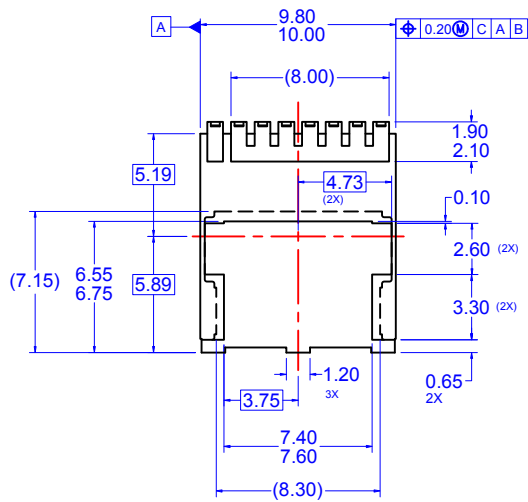
TOP VIEW



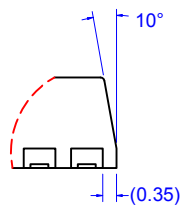
SIDE VIEW



LAND PATTERN RECOMMENDATION



BOTTOM VIEW



DETAIL "B"

- NOTES: UNLESS OTHERWISE SPECIFIED
- A) PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE A, DATED NOVEMBER 2009.
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
  - D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
  - E) DRAWING FILE NAME: MKT-PSOF08AREV3

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