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January 2016

FDBL0110N60

N-Channel PowerTrench[®] MOSFET

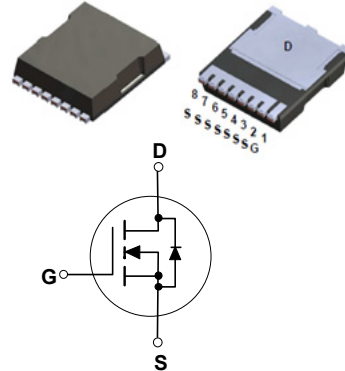
60 V, 300 A, 1.1 mΩ

Features

- Typical $R_{DS(on)}$ = 0.85 mΩ at V_{GS} = 10V, I_D = 80 A
- Typical $Q_{g(tot)}$ = 170 nC at V_{GS} = 10V, I_D = 80 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



For current package drawing, please refer to the Fairchild website at https://www.fairchildsemi.com/evaluate/package-specifications/packageDetails.html?id=PN_PSOFA-008

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

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-to-Source Voltage	60	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D	Drain Current - Continuous ($V_{GS}=10$) (Note 1)	$T_C = 25^\circ\text{C}$	A
	Pulsed Drain Current	$T_C = 25^\circ\text{C}$	
E_{AS}	Single Pulse Avalanche Energy (Note 2)	1167	mJ
P_D	Power Dissipation	429	W
	Derate Above 25°C	2.86	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	0.35	$^\circ\text{C/W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient (Note 3)	43	$^\circ\text{C/W}$

Notes:

- 1: Current is limited by bondwire configuration.
- 2: Starting $T_J = 25^\circ\text{C}$, $L = 0.57\text{mH}$, $I_{AS} = 64\text{A}$, $V_{DD} = 40\text{V}$ 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			
FDBL0110N60	FDBL0110N60	MO-299A	-	-	-

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	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	60	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	$V_{DS} = 60\text{V}$, $T_J = 25^\circ\text{C}$ $V_{GS} = 0\text{V}$, $T_J = 175^\circ\text{C}$ (Note 4)	-	-	1	μA
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	3.0	4.0	V
$R_{DS(on)}$	Drain to Source On Resistance	$I_D = 80\text{A}$, $T_J = 25^\circ\text{C}$ $V_{GS} = 10\text{V}$, $T_J = 175^\circ\text{C}$ (Note 4)	-	0.85	1.1	$\text{m}\Omega$
			-	1.5	2.2	$\text{m}\Omega$

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz		-	13650	-	pF
C _{oss}	Output Capacitance			-	3375	-	pF
C _{rss}	Reverse Transfer Capacitance			-	255	-	pF
R _g	Gate Resistance	f = 1MHz		-	2.3	-	Ω
Q _{g(ToT)}	Total Gate Charge at 10V	V _{GS} = 0 to 10V	V _{DD} = 48V I _D = 80A	-	170	220	nC
Q _{g(th)}	Threshold Gate Charge	V _{GS} = 0 to 2V		-	24	32	nC
Q _{gs}	Gate-to-Source Gate Charge			-	56	-	nC
Q _{gd}	Gate-to-Drain "Miller" Charge			-	24	-	nC

Switching Characteristics

t_{on}	Turn-On Time	$V_{DD} = 30\text{V}$, $I_D = 80\text{A}$, $V_{GS} = 10\text{V}$, $R_{GEN} = 6\Omega$	-	-	137	ns
$t_{d(on)}$	Turn-On Delay		-	45	-	ns
t_r	Rise Time		-	61	-	ns
$t_{d(off)}$	Turn-Off Delay		-	80	-	ns
t_f	Fall Time		-	41	-	ns
t_{off}	Turn-Off Time		-	-	156	ns

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	300	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	See Figure 4	A
V _{SD}	Source-to-Drain Diode Voltage	I _{SD} =80A, V _{GS} = 0V	-	-	1.25	V
		I _{SD} = 40A, V _{GS} = 0V	-	-	1.2	V
t _{rr}	Reverse-Recovery Time	I _F = 80A, dI _{SD} /dt = 100A/μs, V _{DD} =48V	-	107	139	ns
Q _{rr}	Reverse-Recovery Charge		-	183	265	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

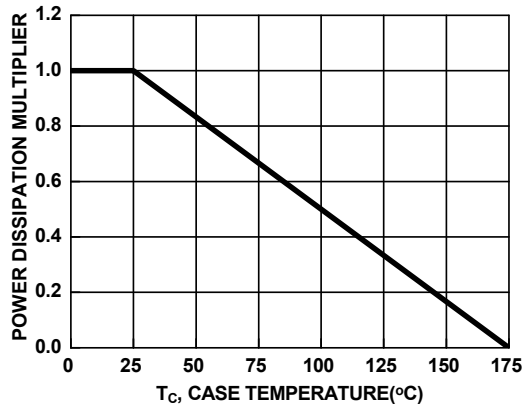


Figure 1. Normalized Power Dissipation vs. Case Temperature

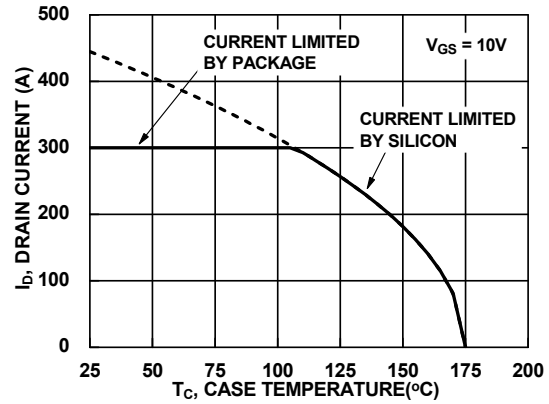


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

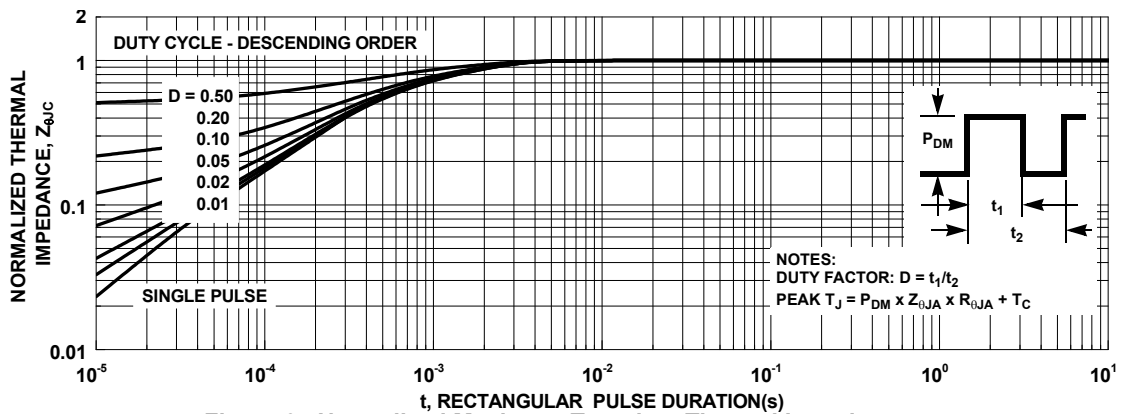


Figure 3. Normalized Maximum Transient Thermal Impedance

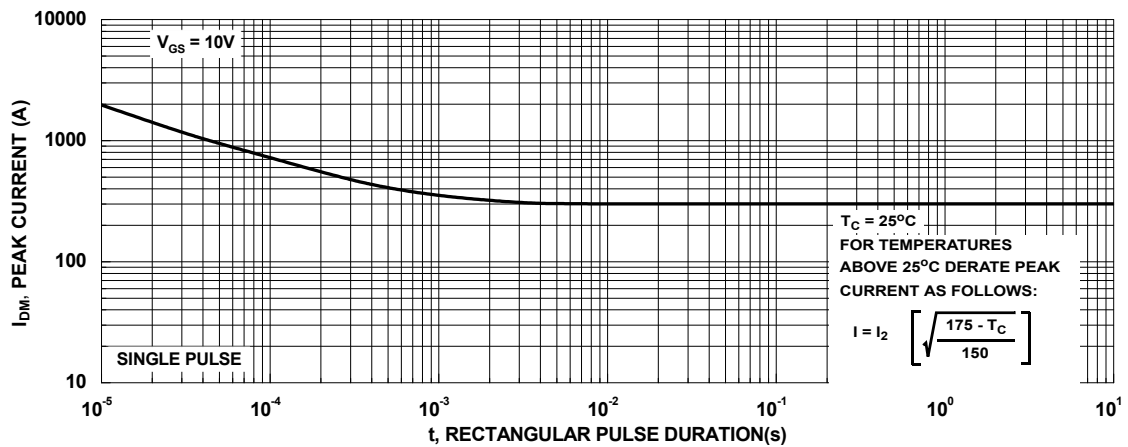


Figure 4. Peak Current Capability

Typical Characteristics

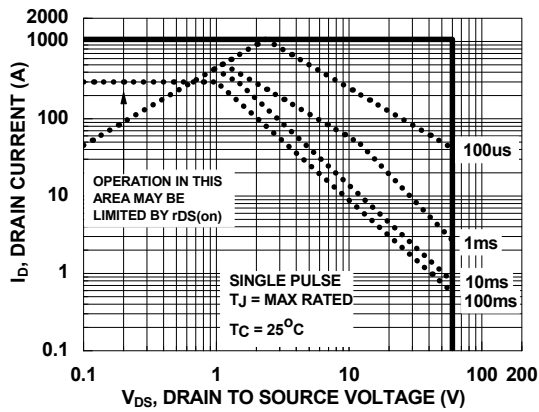
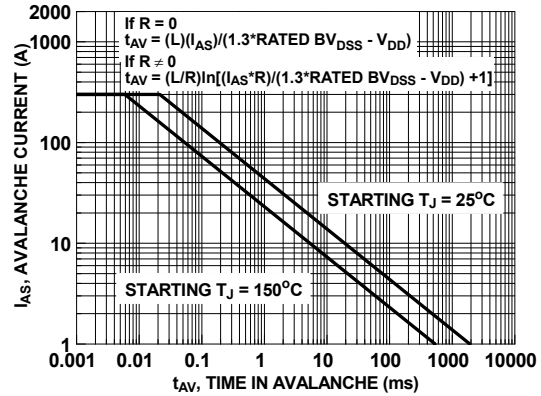


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

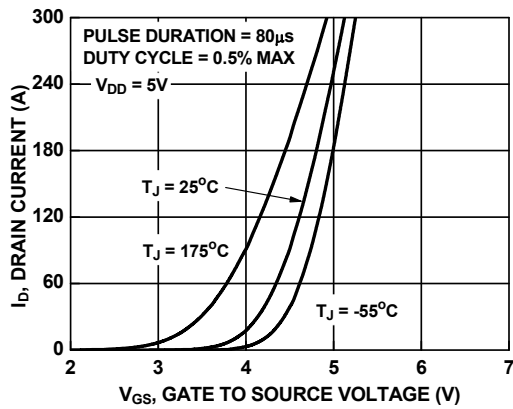


Figure 7. Transfer Characteristics

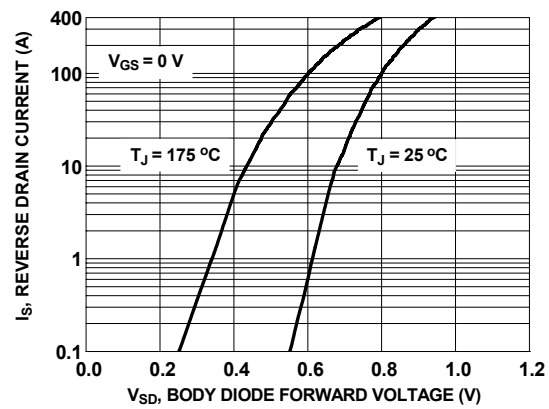


Figure 8. Forward Diode Characteristics

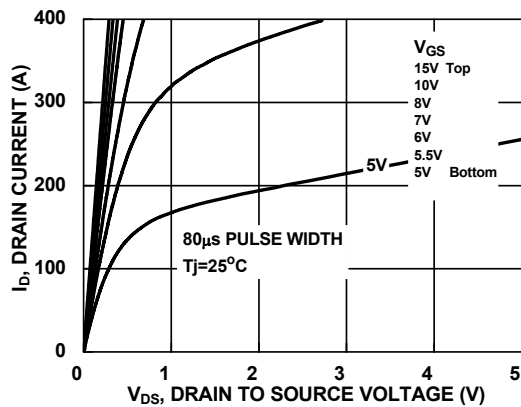


Figure 9. Saturation Characteristics

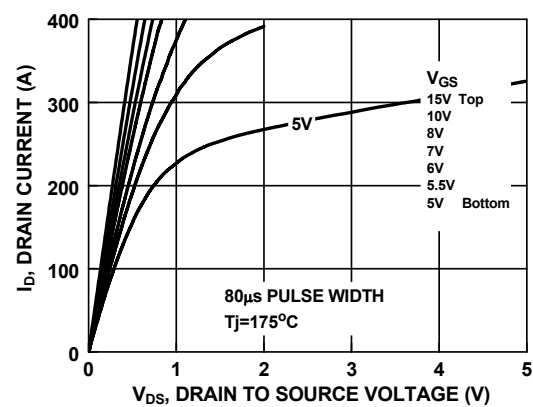
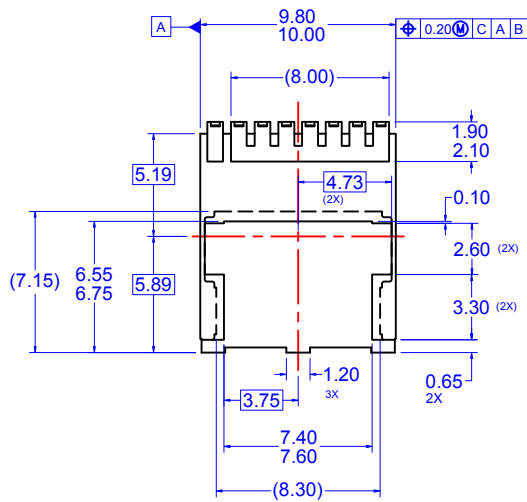
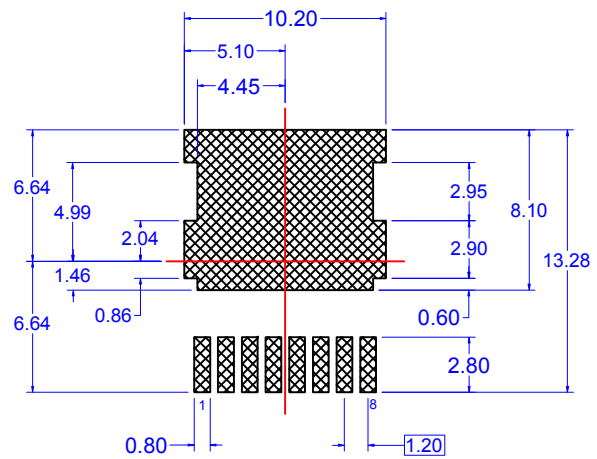
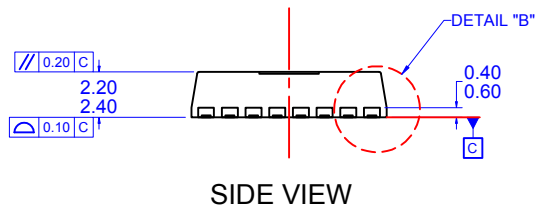
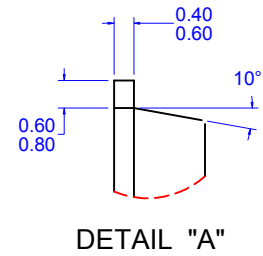
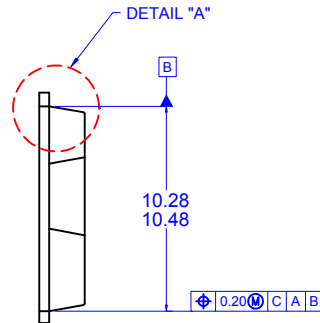
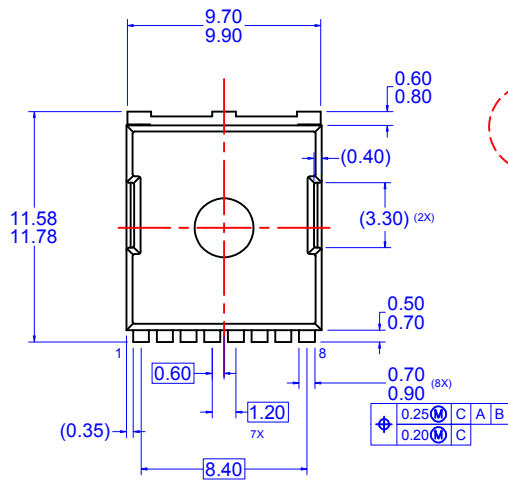
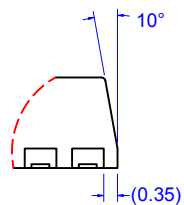


Figure 10. Saturation Characteristics



BOTTOM VIEW



DETAIL "B"

- NOTES: UNLESS OTHERWISE SPECIFIED
- A) PACKAGE STANDARD REFERENCE:
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 - 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.
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