

N-Channel 60-V (D-S) Super Trench Power MOSFET

PRODUCT SUMMARY	
V _{DS} (V)	60
R _{DS(on)} (Ω) at V _{GS} = 10 V	0.0049
R _{DS(on)} (Ω) at V _{GS} = 4.5 V	0.0055
I _D (A)	97
Configuration	Single

FEATURES

- Super Trench technology Power MOSFET
- Excellent gate charge x R_{ds} (on) product(FOM)
- Very low on-resistance R_{ds} (on)
- 100 % R_g and UIS Tested

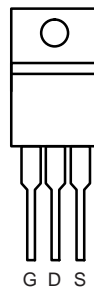


RoHS
COMPLIANT
HALOGEN
FREE

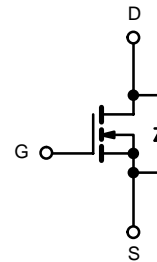
APPLICATIONS

- Isolated DC/DC Converters

TO-220AB



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V _{DS}	60	V
Gate-Source Voltage		V _{GS}	± 20	
Continuous Drain Current	T _C = 25 °C	I _D	97	A
	T _C = 125 °C		56	
Continuous Source Current (Diode Conduction) ^a		I _S	100	
Pulsed Drain Current ^b		I _{DM}	360	
Single Pulse Avalanche Current	L = 0.1 mH	I _{AS}	45	
Single Pulse Avalanche Energy		E _{AS}	101	
Maximum Power Dissipation ^b	T _C = 25 °C	P _D	136	W
	T _C = 125 °C		45	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to + 175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount ^c	R _{thJA}	40	°C/W
Junction-to-Case (Drain)		R _{thJC}	0.4	

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

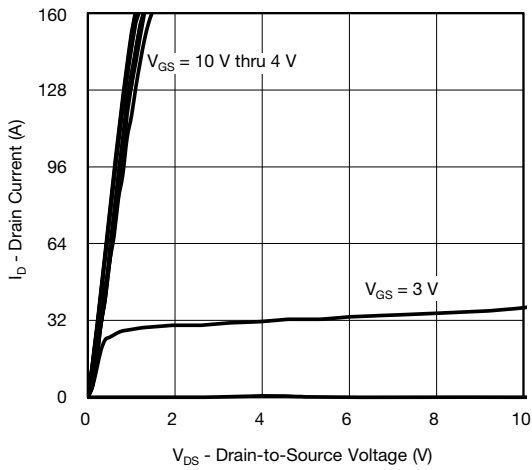
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		60	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		1.2	2.0	3.0	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 60 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 175 °C	-	-	150	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	50	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 25 A	-	0.0049	-	Ω
		V _{GS} = 10 V	I _D = 25 A, T _J = 125 °C	-	0.0117	-	
		V _{GS} = 10 V	I _D = 25 A, T _J = 175 °C	-	0.0149	-	
		V _{GS} = 4.5 V	I _D = 20 A	-	0.0055	-	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 25 A		-	177	-	S
Dynamic^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	4844	6060	pF
Output Capacitance	C _{oss}			-	441	555	
Reverse Transfer Capacitance	C _{rss}			-	200	250	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 30 V, I _D = 50 A	-	82	125	nC
Gate-Source Charge ^c	Q _{gs}			-	14.5	-	
Gate-Drain Charge ^c	Q _{gd}			-	13.5	-	
Gate Resistance	R _g	f = 1 MHz		1	2	3	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.6 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 1 Ω		-	14	21	ns
Rise Time ^c	t _r			-	5	8	
Turn-Off Delay Time ^c	t _{d(off)}			-	41	62	
Fall Time ^c	t _f			-	7	11	
Source-Drain Diode Ratings and Characteristics^b							
Pulsed Current ^a	I _{SM}			-	-	290	A
Forward Voltage	V _{SD}	I _F = 50 A, V _{GS} = 0 V		-	0.9	1.5	V

Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



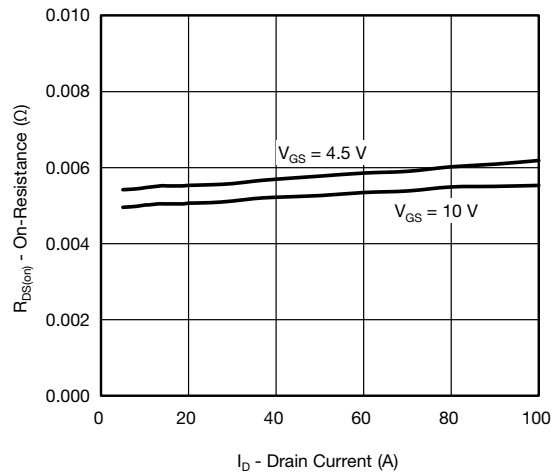
Output Characteristics



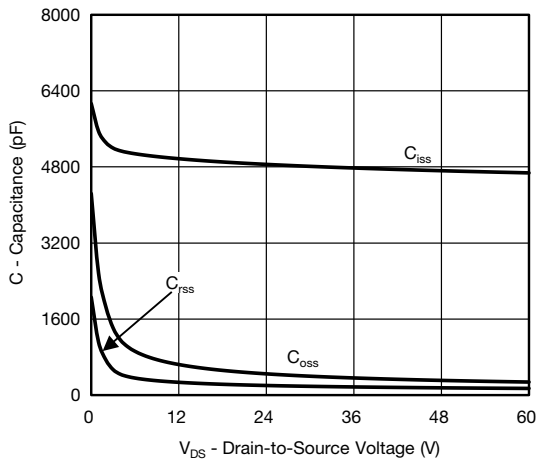
Transfer Characteristics



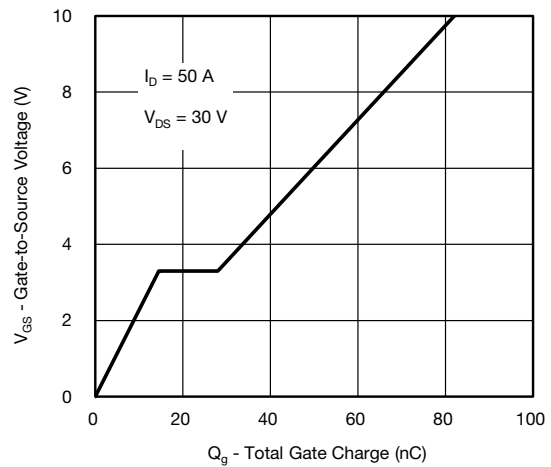
Transconductance



On-Resistance vs. Drain Current

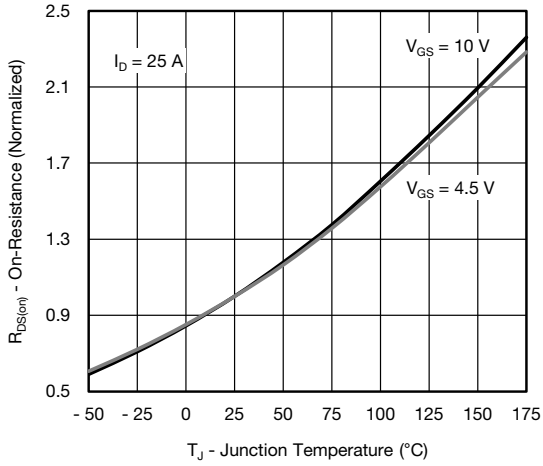


Capacitance

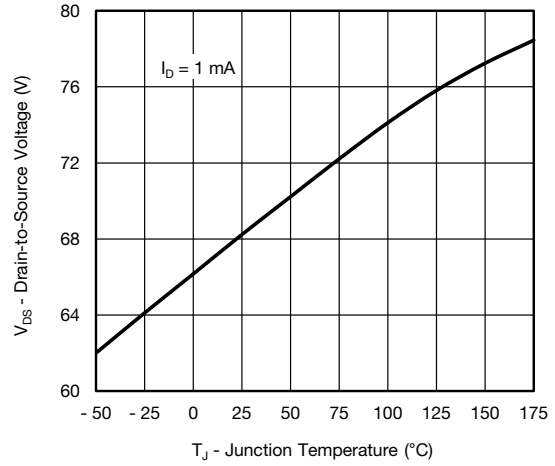


Gate Charge

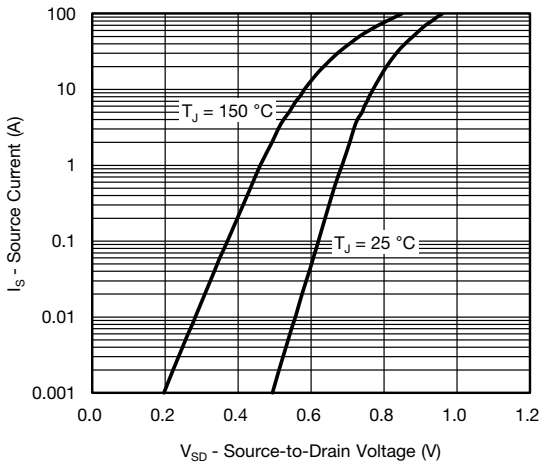
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



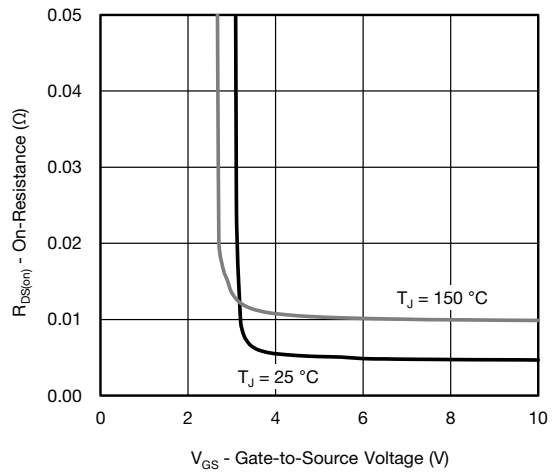
On-Resistance vs. Junction Temperature



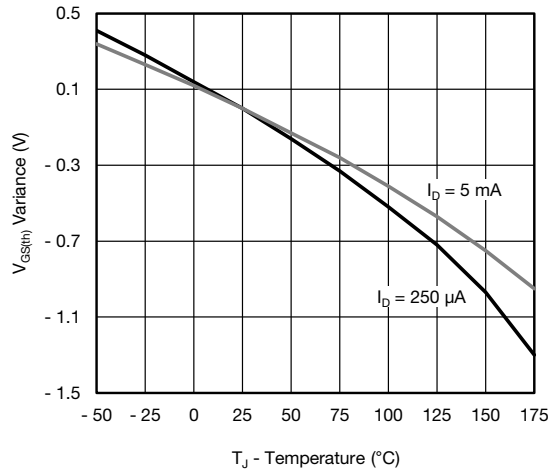
Drain Source Breakdown vs. Junction Temperature



Source Drain Diode Forward Voltage

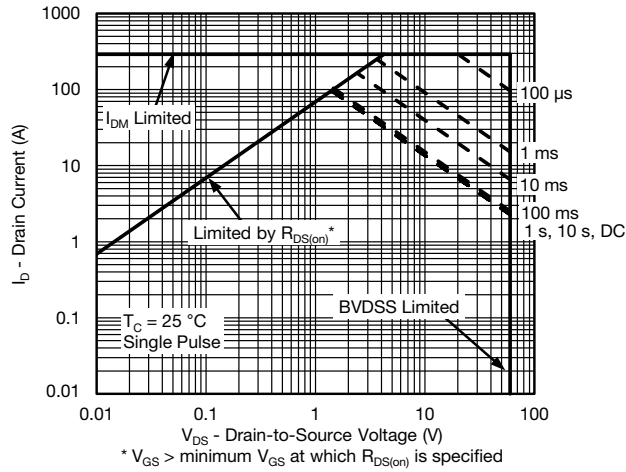


On-Resistance vs. Gate-to-Source Voltage

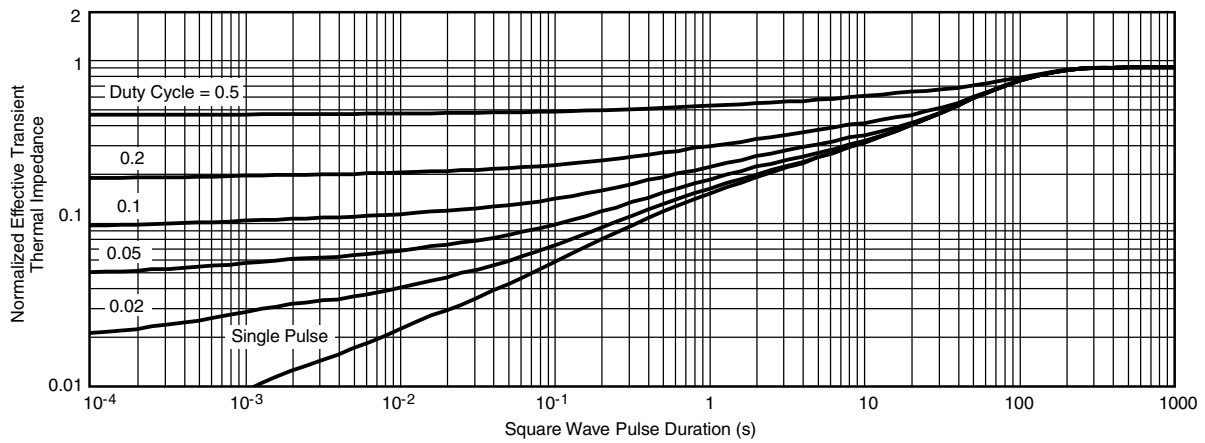


Threshold Voltage

THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)

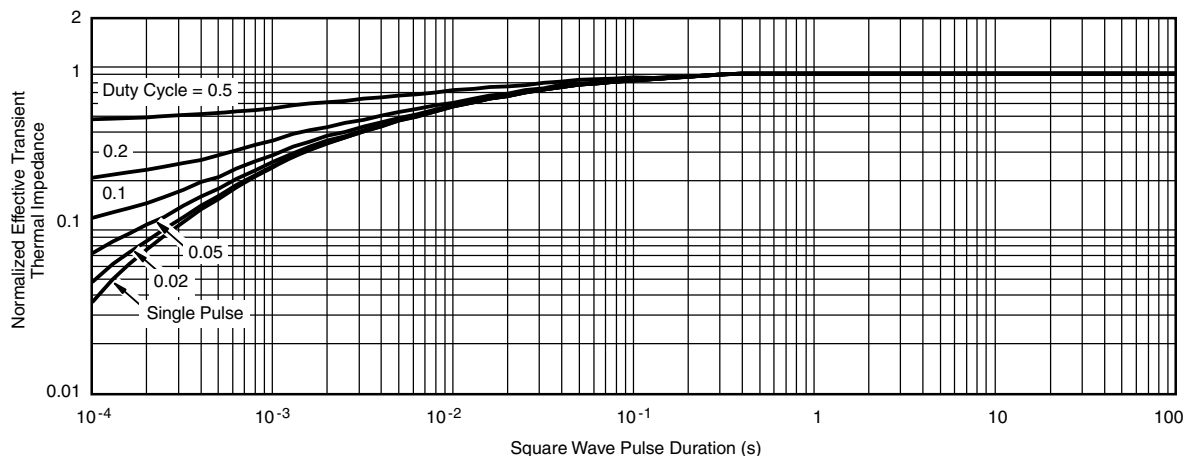


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)

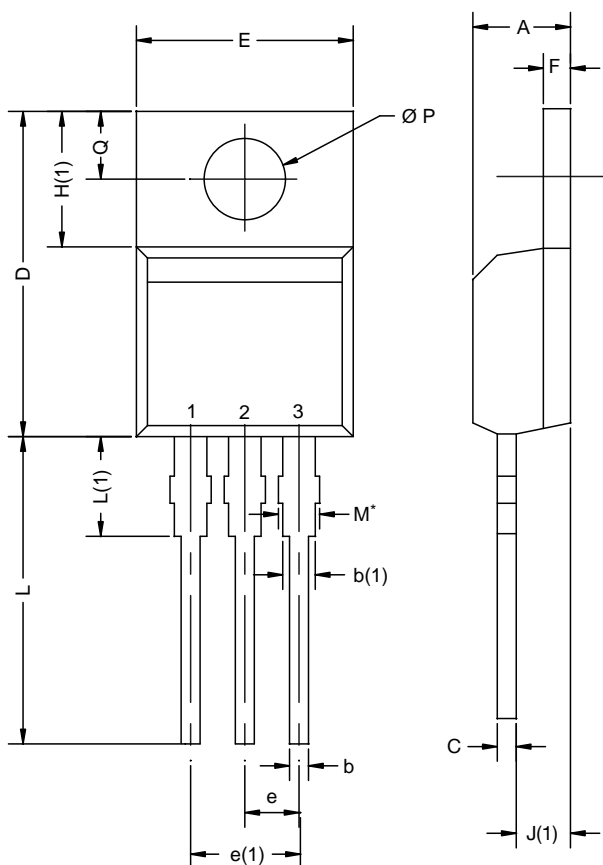


Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Case (25 °C)
 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: X12-0208-Rev. N, 08-Oct-12
DWG: 5471

Notes

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM

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