

N-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (mA)	Q _g (Typ.)
60	1.0 at V _{GS} = 10 V	360	0.45nC
	1.2 at V _{GS} = 4.5 V	340	

FEATURES

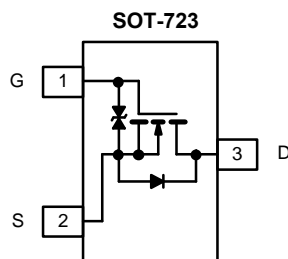
- DT-Trench Power MOSFET: 1.2 V Rated
- 100 % R_g Tested
- Small package
- High-speed switching
- Gate-Source ESD Protected



RoHS
COMPLIANT

APPLICATIONS

- Load/Power Switching for Portable Devices
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits



ABSOLUTE MAXIMUM RATINGS (T _A = 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 _J = 150 °C) ^a	T _A = 25 °C	I _D	360 ^{a, b}	mA
	T _A = 70 °C		330 ^{a, b}	
Pulsed Drain Current (t = 300 μs)		I _{DM}	1420	
Continuous Source-Drain Diode Current	T _A = 25 °C	I _S	360 ^{a, b}	mA
Maximum Power Dissipation ^a	T _A = 25 °C	P _D	240 ^{a, b}	mW
	T _A = 70 °C		153.6 ^{a, b}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	t ≤ 5 s	R _{thJA}	440	530	°C/W
	Steady State		540	650	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. t = 5 s.

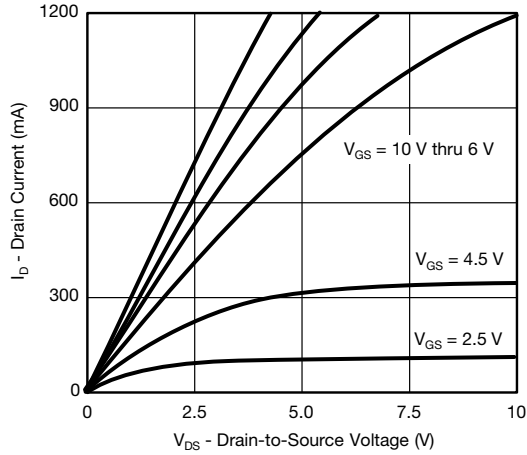
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		25		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 1.8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 10	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	2			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 300\text{ mA}$		1.0	1.5	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 300\text{ mA}$		1.2	2.0	
Forward Transconductance	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 300\text{ mA}$		250		mS
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		23		pF
Output Capacitance	C_{oss}			10		
Reverse Transfer Capacitance	C_{rss}			3		
Total Gate Charge	Q_g	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 300\text{ mA}$		4.3		nC
Gate-Source Charge	Q_{gs}			0.15		
Gate-Drain Charge	Q_{gd}			0.11		
Gate Resistance	R_g	$f = 1\text{ MHz}$		8.5		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 20\text{ }\Omega$ $I_D \cong 300\text{ mA}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		4.5		ns
Rise Time	t_r			4.9		
Turn-Off Delay Time	$t_{d(off)}$			20		
Fall Time	t_f			11		
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current ^a	I_{SM}				360	mA
Body Diode Voltage	V_{SD}	$I_S = 300\text{ mA}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 300\text{ mA}, di/dt = 100\text{ A}/\mu\text{s}$		10	15	ns
Body Diode Reverse Recovery Charge	Q_{rr}			2	4	nC
Reverse Recovery Fall Time	t_a			5		ns
Reverse Recovery Rise Time	t_b			5		

Notes:

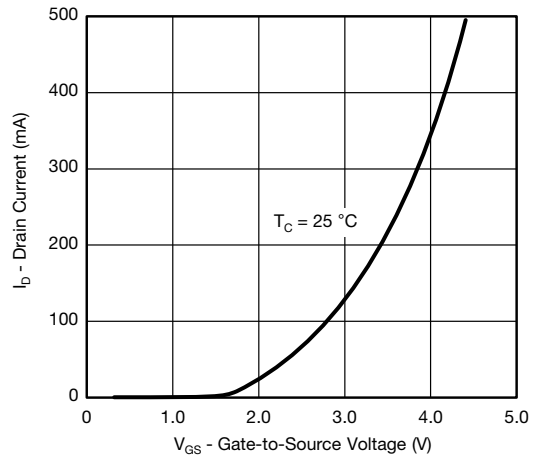
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

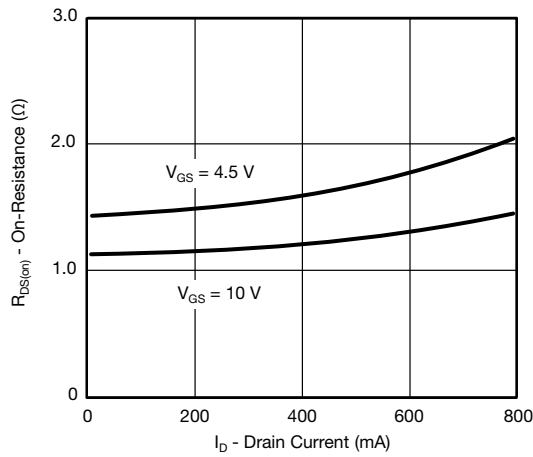
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



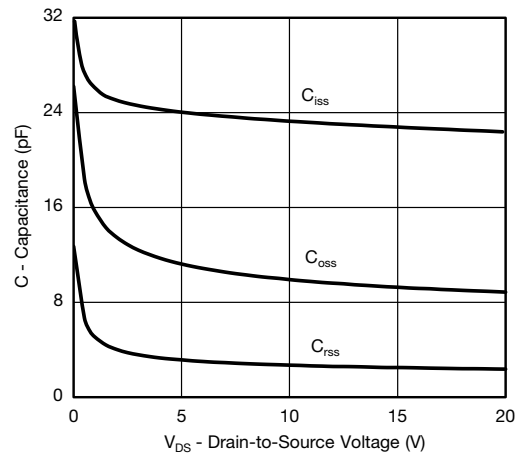
Output Characteristics



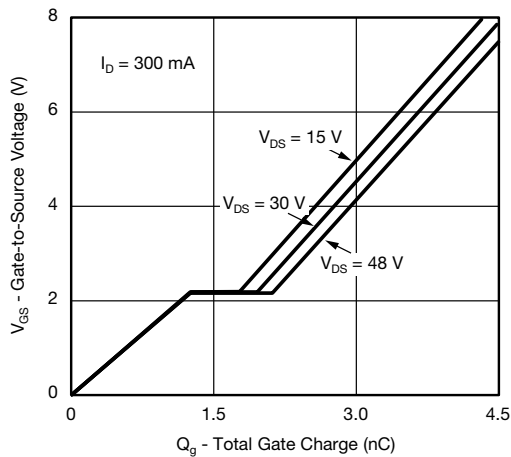
Transfer Characteristics



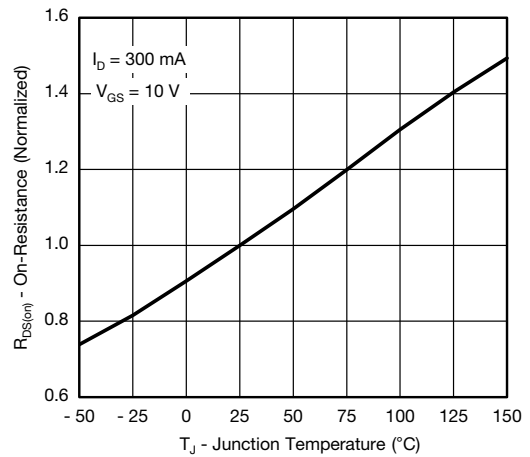
On-Resistance vs. Drain Current



Capacitance

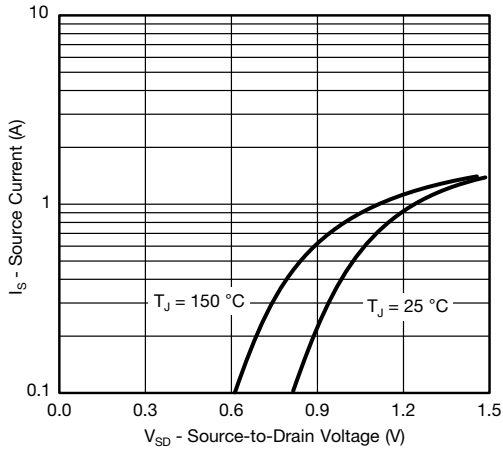


Gate Charge

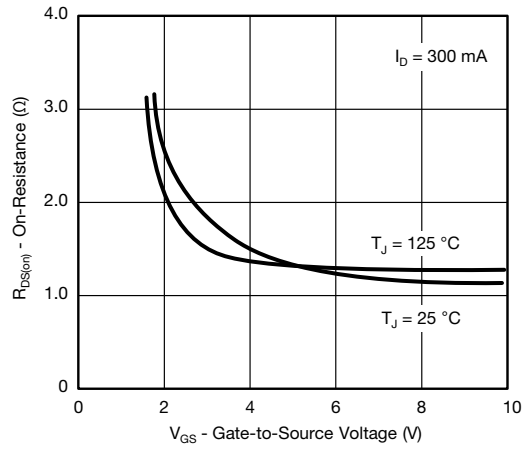


On-Resistance vs. Junction Temperature

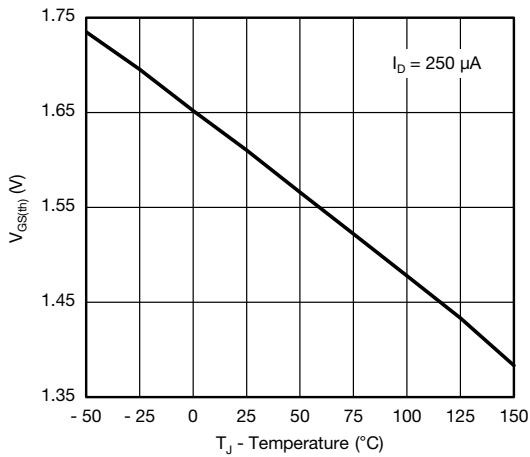
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



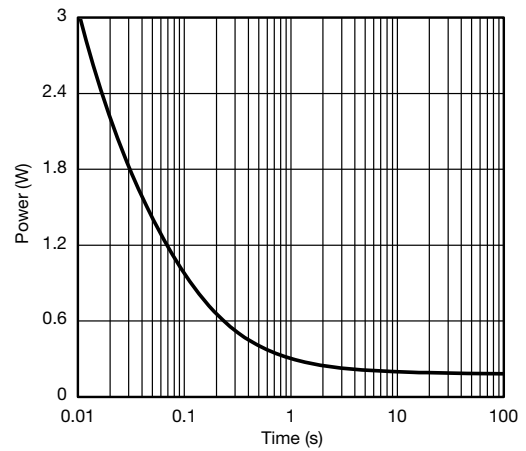
Source-Drain Diode Forward Voltage



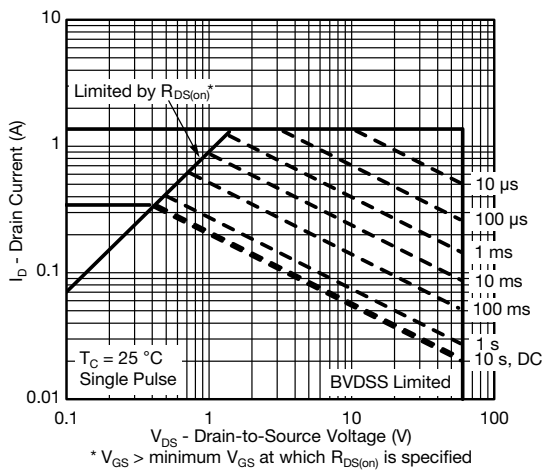
On-Resistance vs. Gate-to-Source Voltage



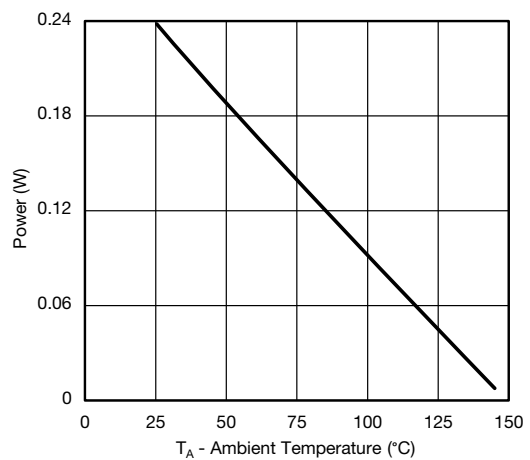
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

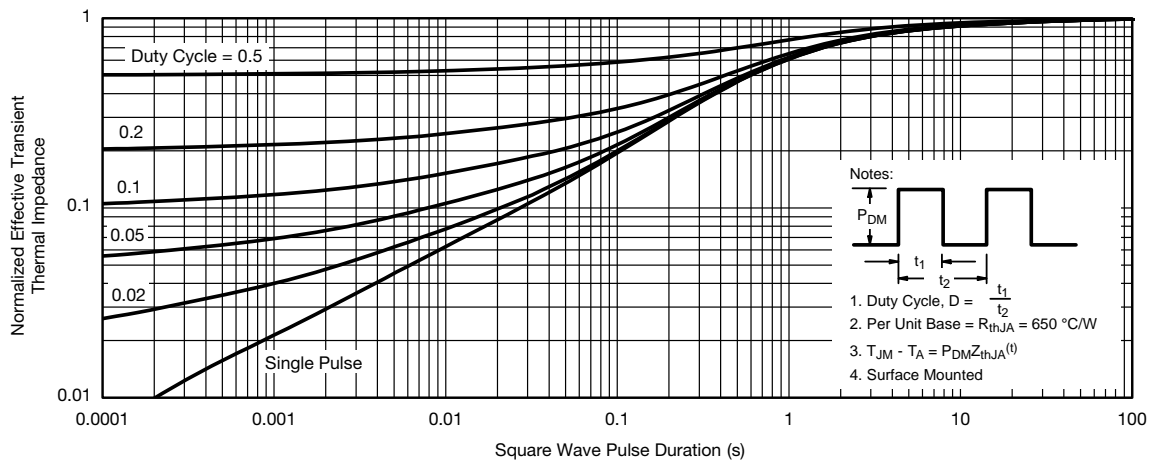


Safe Operating Area, Junction-to-Ambient



Power Derating, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



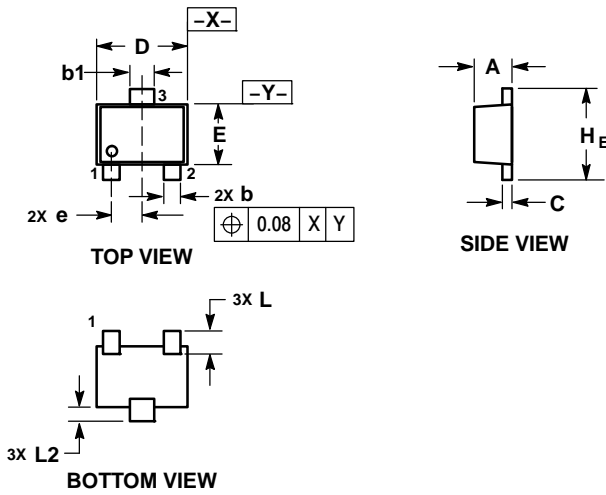
Normalized Thermal Transient Impedance, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max.)} = 150 \text{ }^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

SOT-723



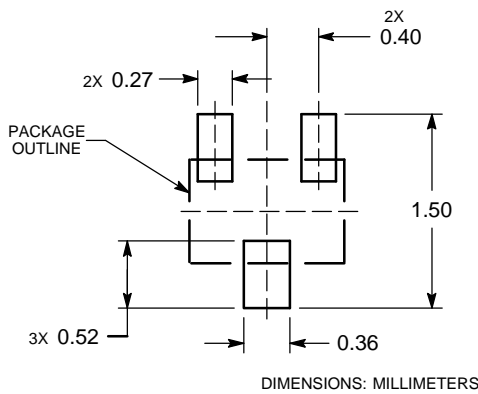
SCALE 4:1



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.45	0.50	0.55
b	0.15	0.21	0.27
b1	0.25	0.31	0.37
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H _E	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

**RECOMMENDED
SOLDERING FOOTPRINT***



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