

## Dual N-Channel 60 V (D-S) MOSFET



**RoHS**  
COMPLIANT

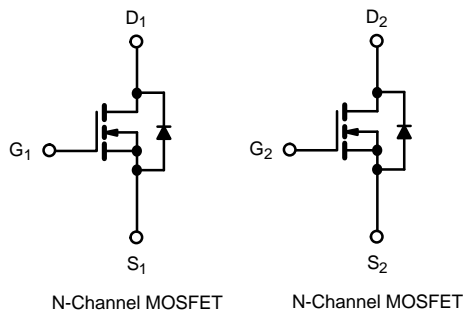
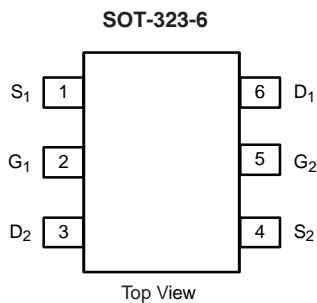
PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
60	1.6 at V <sub>GS</sub> = 10 V	0.45	1.3 nC
	1.9 at V <sub>GS</sub> = 4.5 V	0.39	

### FEATURES

- DT-Trench Power MOSFET
- Very Small Footprint
- 100 % Rg and UIS Tested

### APPLICATIONS

- LED Inverter Circuits
- DC/DC Conversion Circuits
- Motor drives



ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V <sub>DS</sub>	60	V
Gate-source voltage	V <sub>GS</sub>	± 20	
Continuous drain current	I <sub>D</sub>	T <sub>C</sub> = 25 °C <sup>a</sup>	0.45
		T <sub>C</sub> = 85 °C	0.36
Continuous source current (diode conduction) <sup>a</sup>	I <sub>S</sub>	0.45	A
Pulsed drain current <sup>b</sup>	I <sub>DM</sub>	1.8	
Single pulse avalanche current	I <sub>AS</sub>	0.43	
Single pulse avalanche energy	E <sub>AS</sub>	0.9	mJ
Maximum power dissipation <sup>b</sup>	P <sub>D</sub>	T <sub>C</sub> = 25 °C	0.35
		T <sub>C</sub> = 85 °C	0.182
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R <sub>thJA</sub>	135	°C/W
Junction-to-foot (drain)	R <sub>thJF</sub>	45	

Notes:

a. Surface mounted on FR4 board.

b. Pulse width limited by maximum junction temperature.

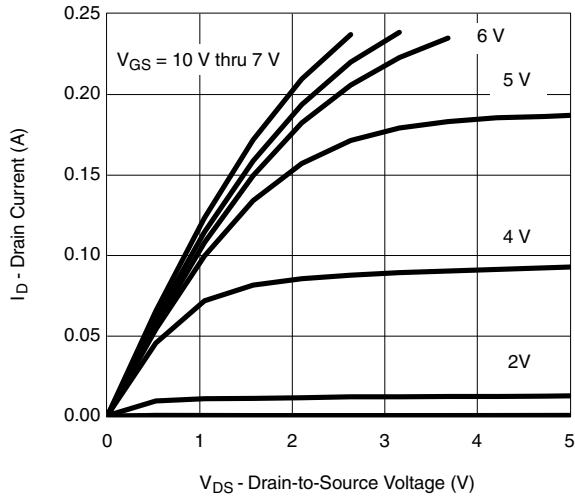
SPECIFICATIONS (T <sub>C</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	60	-	-	V
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.0	-	3.0	
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 12 V	-	-	± 5	μA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 5	mA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 48 V	-	-	1	
		V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 48 V, T <sub>J</sub> = 125 °C	-	-	50	μA
		V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 48 V, T <sub>J</sub> = 150 °C	-	-	150	
On-state drain current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> ≤ 5 V	0.45	-	-	A
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.25 A	-	1.6	1.95	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.2 A, T <sub>J</sub> = 125 °C	-	1.85	2.4	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.16 A	-	1.9	2.5	
Forward transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.25 A	-	3	-	S
<b>Dynamic <sup>b</sup></b>						
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 30 V, f = 1 MHz	-	60	-	
Output capacitance	C <sub>oss</sub>		-	17	-	pF
Reverse transfer capacitance	C <sub>rss</sub>		-	8	-	
Total gate charge <sup>c</sup>	Q <sub>g</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 30 V, I <sub>D</sub> = 0.16 A	-	1.3	-	
Gate-source charge <sup>c</sup>	Q <sub>gs</sub>		-	0.2	-	nC
Gate-drain charge <sup>c</sup>	Q <sub>gd</sub>		-	0.9	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz	-	5.2	-	Ω
Turn-on delay time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 30 V, R <sub>L</sub> = 30 Ω I <sub>D</sub> ≅ 0.16 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 1 Ω	-	43	68	
Rise time <sup>c</sup>	t <sub>r</sub>		-	27	35	ns
Turn-off delay time <sup>c</sup>	t <sub>d(off)</sub>		-	12	20	
Fall time <sup>c</sup>	t <sub>f</sub>		-	9	15	
<b>Source-Drain Diode Ratings and Characteristics <sup>b</sup></b>						
Pulsed current <sup>a</sup>	I <sub>SM</sub>		-	-	0.45	A
Forward voltage	V <sub>SD</sub>	I <sub>F</sub> = 0.45 A, V <sub>GS</sub> = 0 V	-	0.8	1.2	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

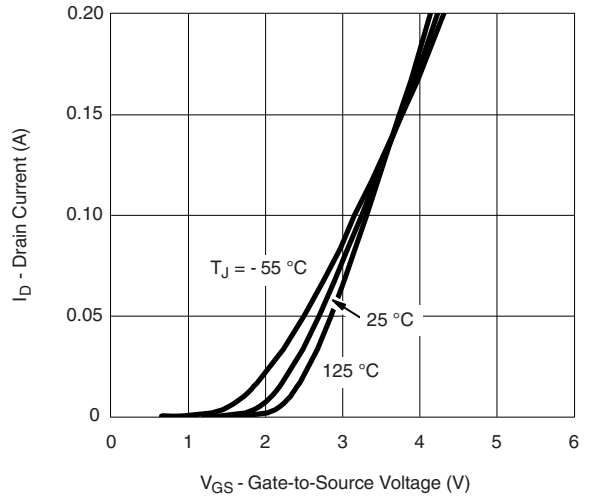
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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



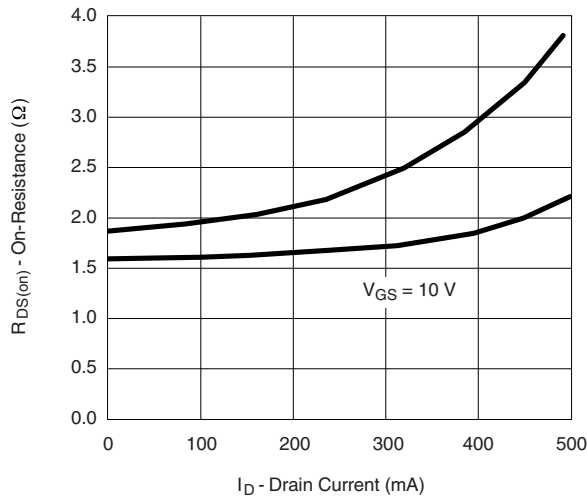
$V_{DS}$  - Drain-to-Source Voltage (V)

**Output Characteristics**

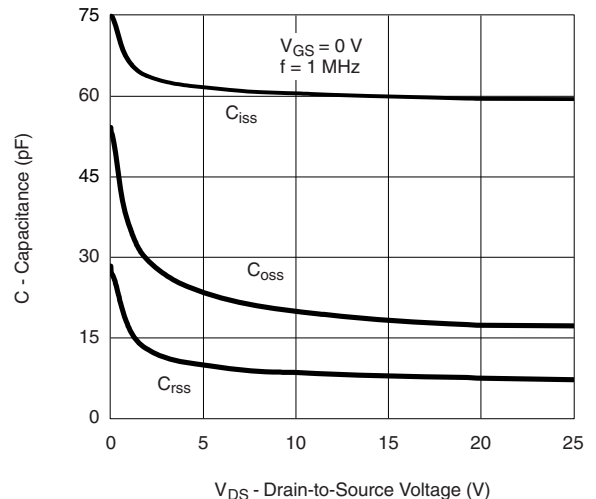


$V_{GS}$  - Gate-to-Source Voltage (V)

**Transfer Characteristics**

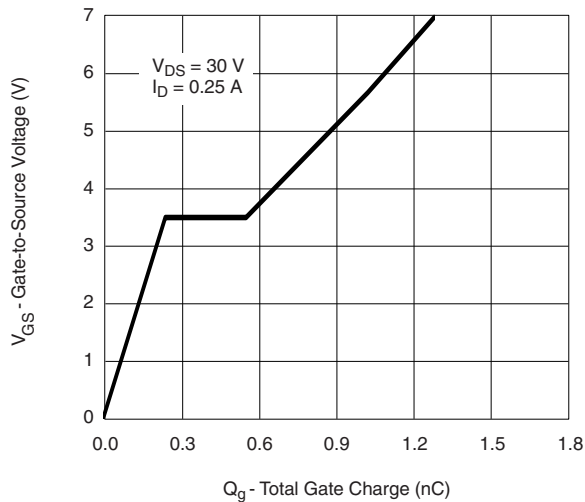


**On-Resistance vs. Drain Current**



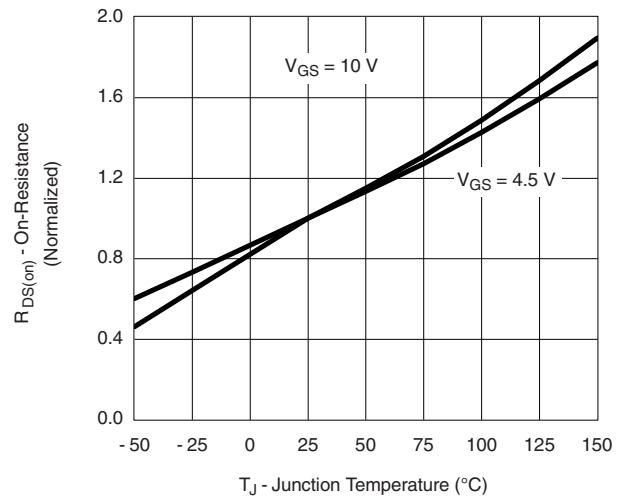
$V_{DS}$  - Drain-to-Source Voltage (V)

**Capacitance**



$Q_g$  - Total Gate Charge (nC)

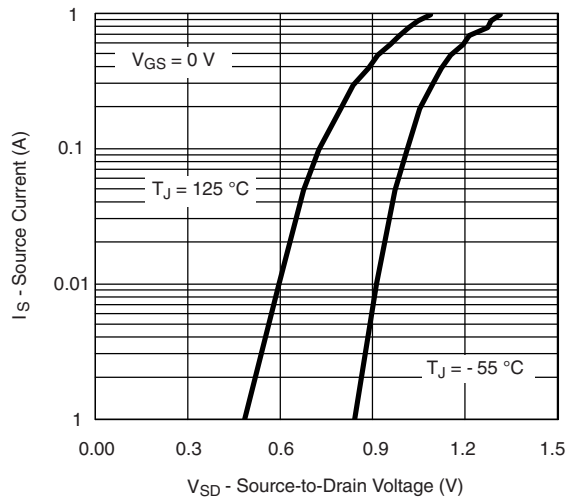
**Gate Charge**



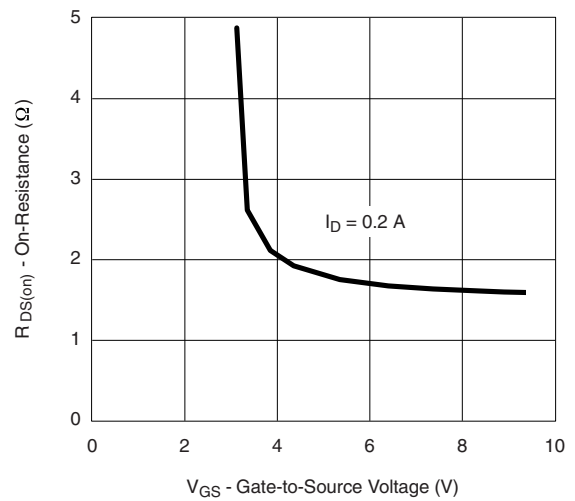
$T_J$  - Junction Temperature ( $^\circ\text{C}$ )

**On-Resistance vs. Junction Temperature**

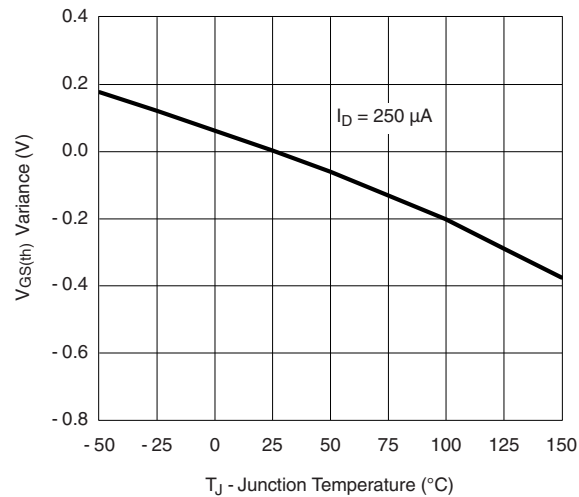
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



**Source-Drain Diode Forward Voltage**

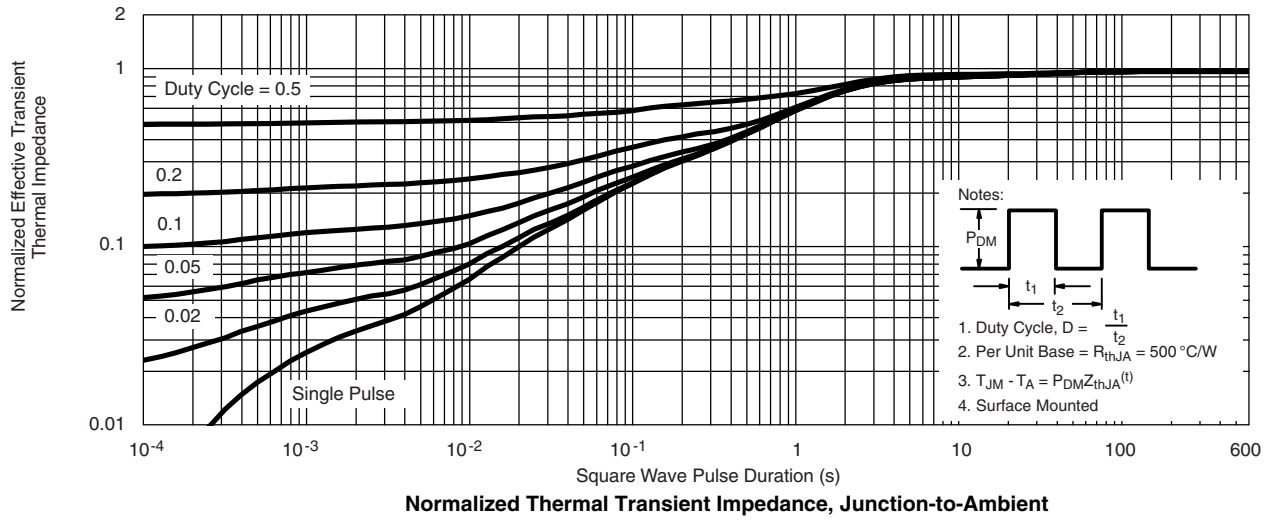


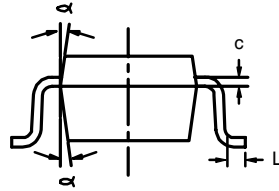
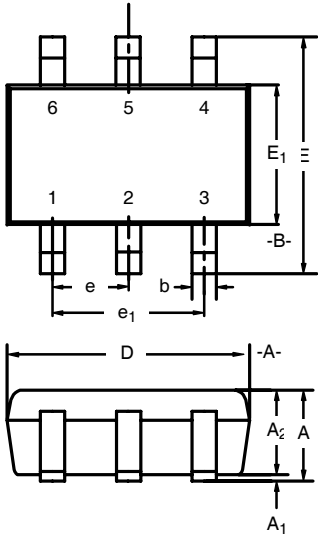
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage Variance Over Temperature**

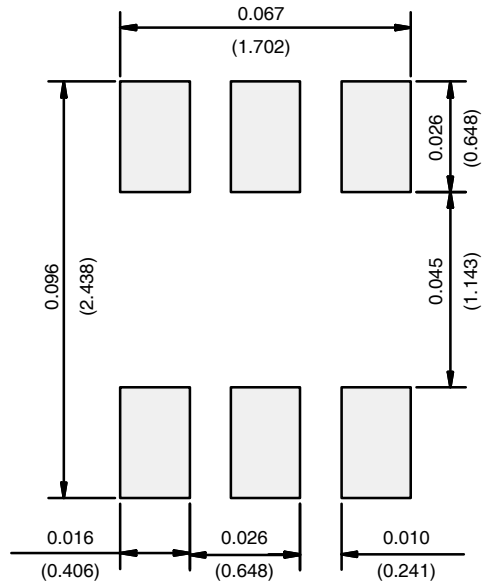
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)





Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
<b>A</b>	0.90	-	1.10	0.035	-	0.043
<b>A<sub>1</sub></b>	-	-	0.10	-	-	0.004
<b>A<sub>2</sub></b>	0.80	-	1.00	0.031	-	0.039
<b>b</b>	0.15	-	0.30	0.006	-	0.012
<b>c</b>	0.10	-	0.25	0.004	-	0.010
<b>D</b>	1.80	2.00	2.20	0.071	0.079	0.087
<b>E</b>	1.80	2.10	2.40	0.071	0.083	0.094
<b>E<sub>1</sub></b>	1.15	1.25	1.35	0.045	0.049	0.053
<b>e</b>	0.65BSC			0.026BSC		
<b>e<sub>1</sub></b>	1.20	1.30	1.40	0.047	0.051	0.055
<b>L</b>	0.10	0.20	0.30	0.004	0.008	0.012
<b>α</b>	7°Nom			7°Nom		

**RECOMMENDED MINIMUM PADS FOR SOT323: 6-Lead**



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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