

## N- and P-Channel 20 V (D-S) MOSFET

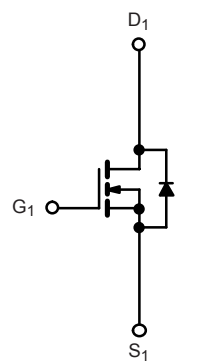
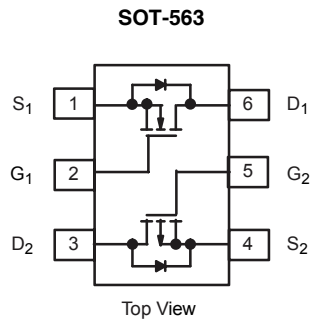
PRODUCT SUMMARY			
	V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
N-Channel	20	0.299 at V <sub>GS</sub> = 4.5 V	1.2
		0.426 at V <sub>GS</sub> = 2.5 V	0.9
P-Channel	- 20	0.689 at V <sub>GS</sub> = - 4.5 V	- 0.5
		0.873 at V <sub>GS</sub> = - 2.5 V	- 0.4

### FEATURES

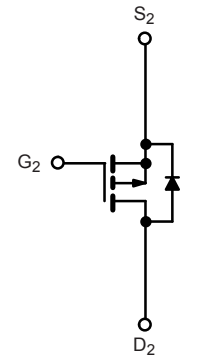
- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> Tested
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT



N-Channel MOSFET



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted					
Parameter	Symbol	N-Channel	P-Channel	Unit	
Drain-Source Voltage	V <sub>DS</sub>	20	- 20	V	
Gate-Source Voltage	V <sub>GS</sub>	12	-12		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a, b</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	1.2	- 0.5	A
		T <sub>A</sub> = 70 °C	0.9	- 0.4	
Pulsed Drain Current	I <sub>DM</sub>	3.5	- 2		
Maximum Power Dissipation <sup>a, b</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	1.15		W
		T <sub>A</sub> = 70 °C	0.3		
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C	
THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	130	200	°C/W	
Maximum Junction-to-Lead	R <sub>thJL</sub>	85	190		

Notes:

a. Surface Mounted on FR4 board.

b. t ≤ 10 s.

SPECIFICATIONS $T_J = 25^\circ\text{C}$ , unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Static</b>							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	N-Ch	0.4		1.2	V
		$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$	P-Ch	-0.4		-1.2	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 12 \text{ V}$	N-Ch			$\pm 100$	nA
			P-Ch			$\pm 100$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}$	N-Ch			1	$\mu\text{A}$
			P-Ch			-1	
			N-Ch			10	
			P-Ch			-5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	N-Ch	3.5			A
		$V_{DS} = -5 \text{ V}, V_{GS} = -10 \text{ V}$	P-Ch	-2			
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5 \text{ V}, I_D = 0.8 \text{ A}$	N-Ch		0.299	0.331	$\Omega$
		$V_{GS} = -4.5 \text{ V}, I_D = -0.4 \text{ A}$	P-Ch		0.689	0.760	
		$V_{GS} = 2.5 \text{ V}, I_D = 0.5 \text{ A}$	N-Ch		0.426	0.470	
		$V_{GS} = -2.5 \text{ V}, I_D = -0.2 \text{ A}$	P-Ch		0.873	0.997	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10 \text{ V}, I_D = 0.8 \text{ A}$	N-Ch		3.1		S
		$V_{DS} = -15 \text{ V}, I_D = -0.5 \text{ A}$	P-Ch		2.8		
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 0.8 \text{ A}, V_{GS} = 0 \text{ V}$	N-Ch		0.8	1.10	V
		$I_S = -0.6 \text{ A}, V_{GS} = 0 \text{ V}$	P-Ch		-0.75	-1.2	
<b>Dynamic<sup>b</sup></b>							
Total Gate Charge	$Q_g$	N-Channel $V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 0.5 \text{ A}$  P-Channel $V_{DS} = -10 \text{ V}, V_{GS} = -4.5 \text{ V}, I_D = -0.3 \text{ A}$	N-Ch		1.6	2.2	nC
			P-Ch		2.1	2.6	
Gate-Source Charge	$Q_{gs}$		N-Ch		0.1		
			P-Ch		0.4		
Gate-Drain Charge	$Q_{gd}$		N-Ch		0.2		
			P-Ch		0.5		
Gate Resistance	$R_g$	N-Ch	2.5		3.9	$\Omega$	
		P-Ch	3		4.5		
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 15 \text{ V}, R_L = 15 \Omega$ $I_D \equiv 0.5 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 6 \Omega$  P-Channel $V_{DD} = -15 \text{ V}, R_L = 15 \Omega$ $I_D \equiv -0.5 \text{ A}, V_{GEN} = -10 \text{ V}, R_g = 6 \Omega$	N-Ch		9		ns
			P-Ch		8		
Rise Time	$t_r$		N-Ch		19		
			P-Ch		5.6		
Turn-Off Delay Time	$t_{d(off)}$		N-Ch		23		
			P-Ch		12		
Fall Time	$t_f$	N-Ch		7			
		P-Ch		6.9			
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 0.6 \text{ A}, dI/dt = 100 \text{ A}/\mu\text{s}$	N-Ch		6.3		
		$I_F = -0.6 \text{ A}, dI/dt = 100 \text{ A}/\mu\text{s}$	P-Ch		11		

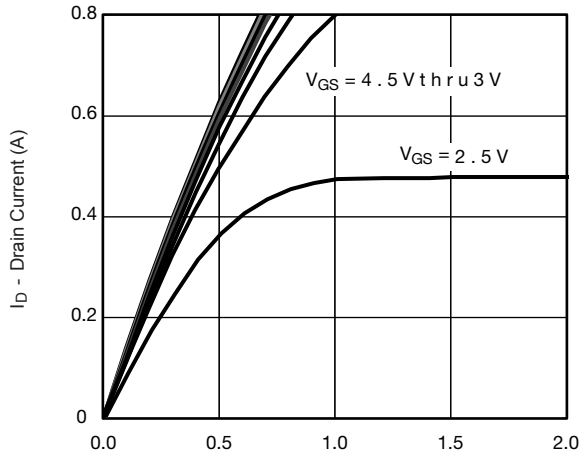
**Notes:**

 a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

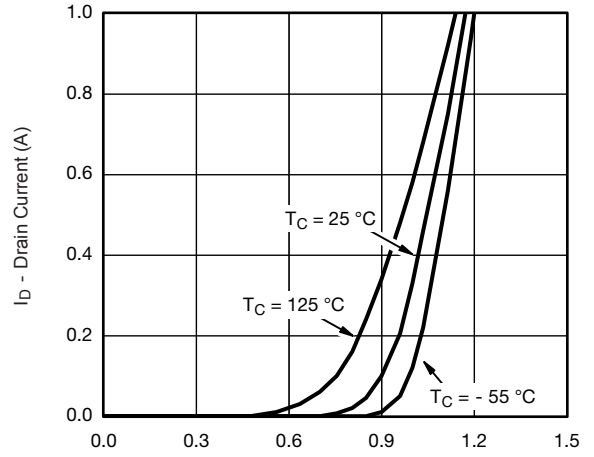
b. Guaranteed by design, not subject to production testing.

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.

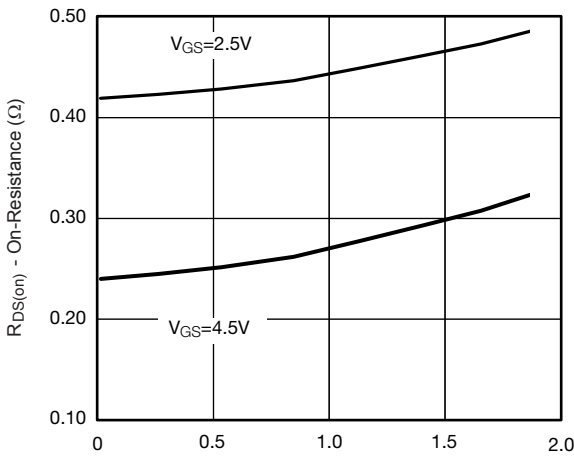
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



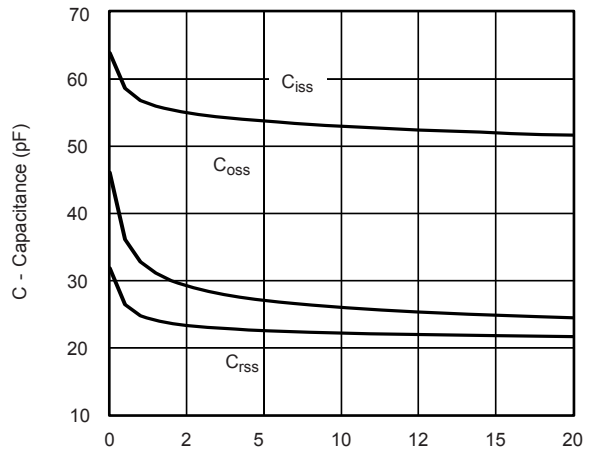
$V_{DS}$  - Drain-to-Source Voltage (V)  
**Output Characteristics**



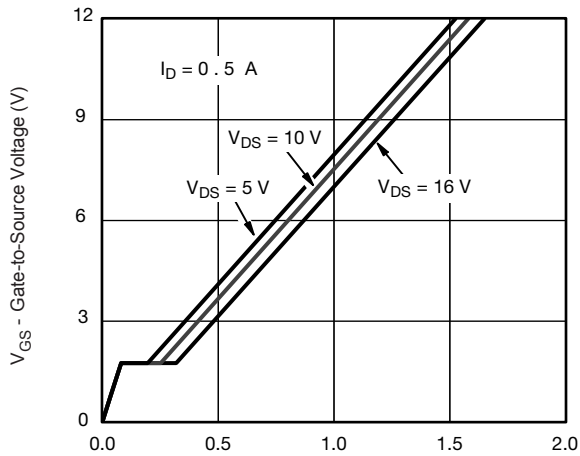
$V_{GS}$  - Gate-to-Source Voltage (V)  
**Transfer Characteristics**



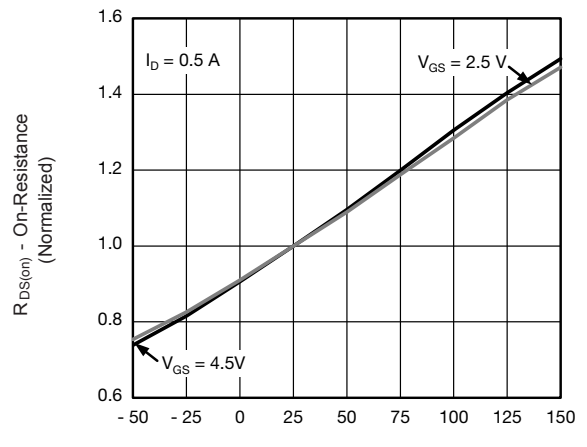
$I_D$  - Drain Current (A)  
**On-Resistance vs. Drain Current**



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

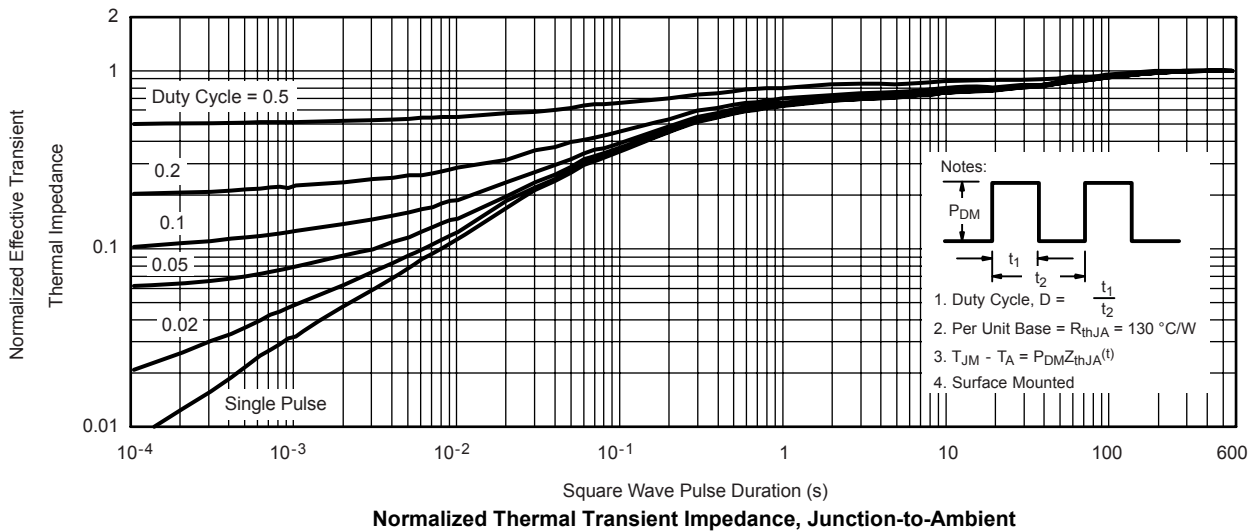
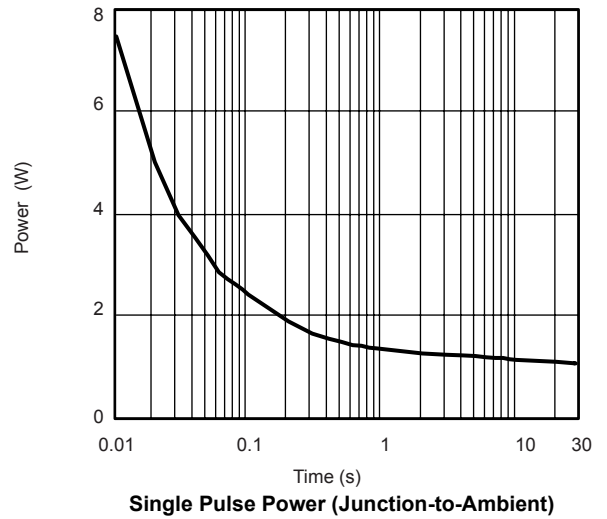
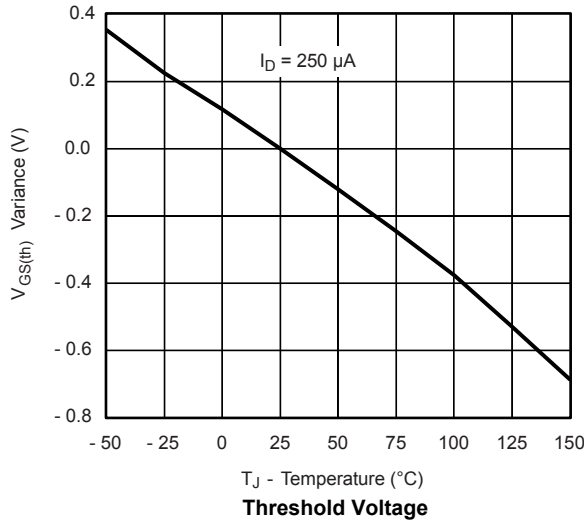
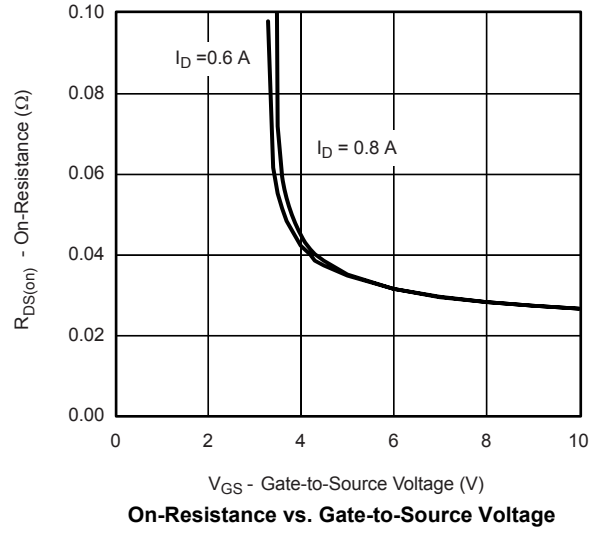
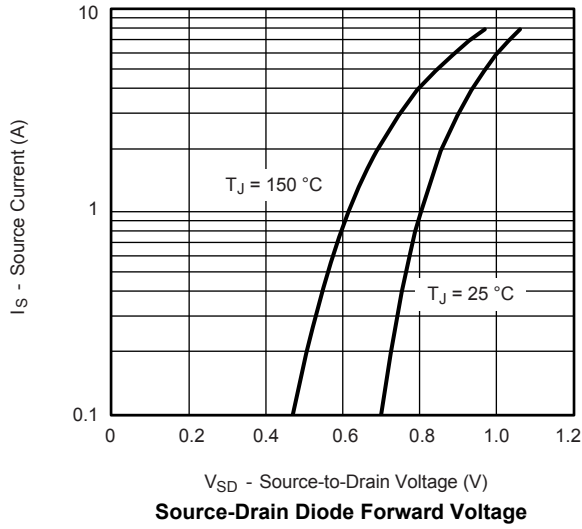


$Q_g$  - Total Gate Charge (nC)  
**Gate Charge**

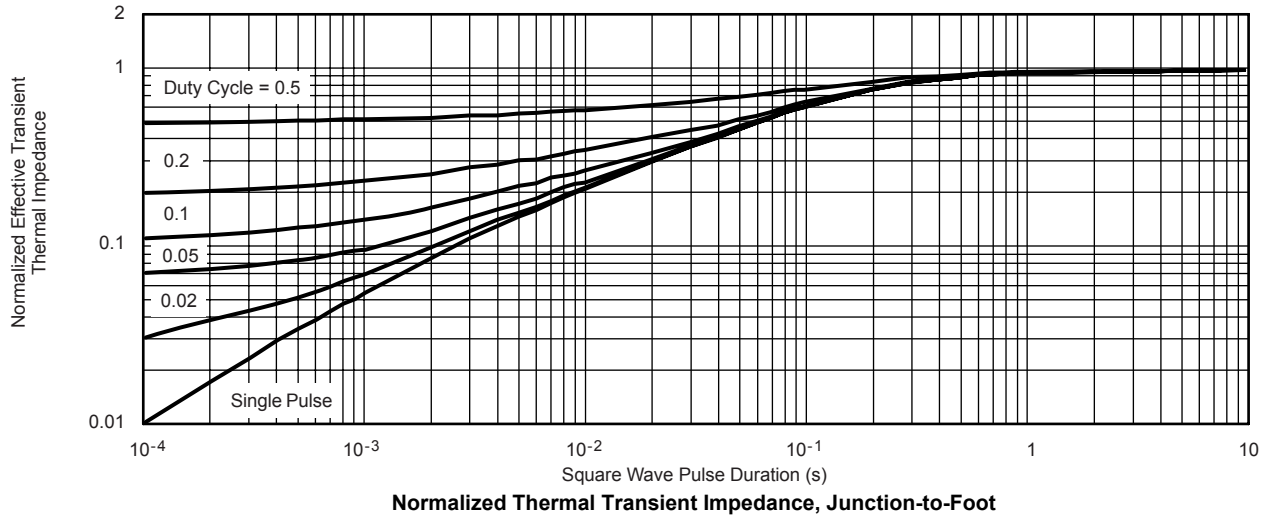


$T_J$  - Junction Temperature ( $^\circ\text{C}$ )  
**On-Resistance vs. Junction Temperature**

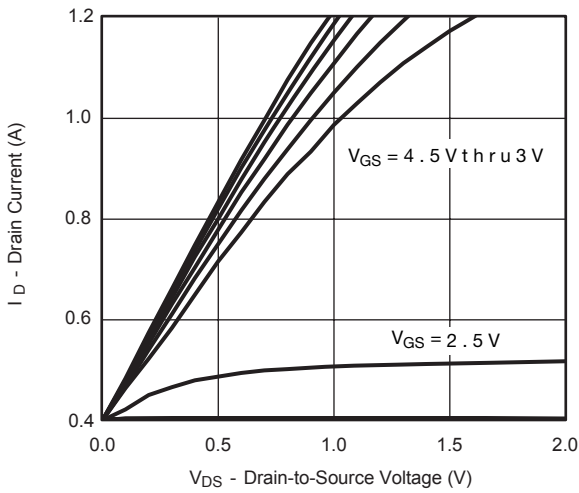
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



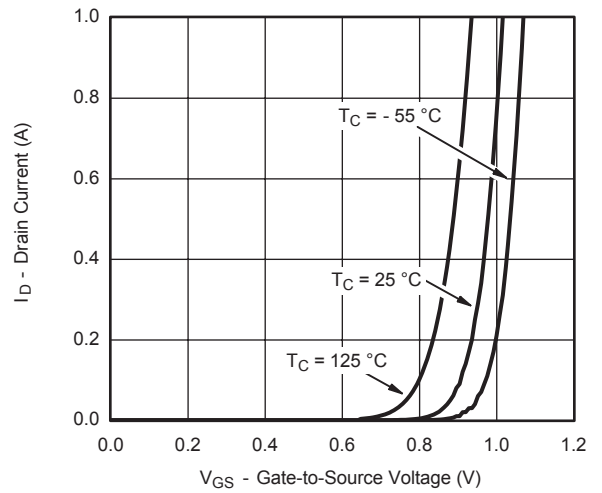
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



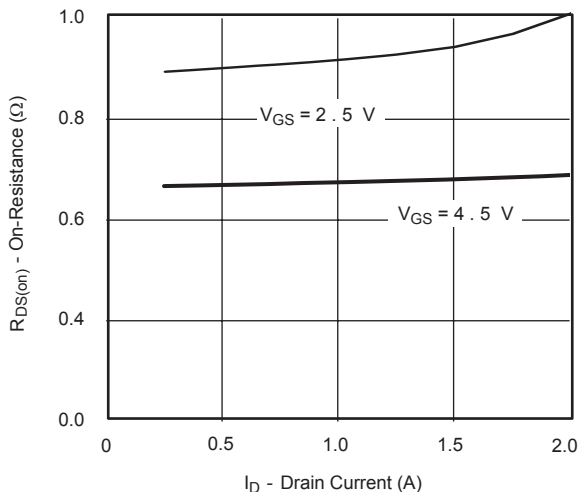
**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



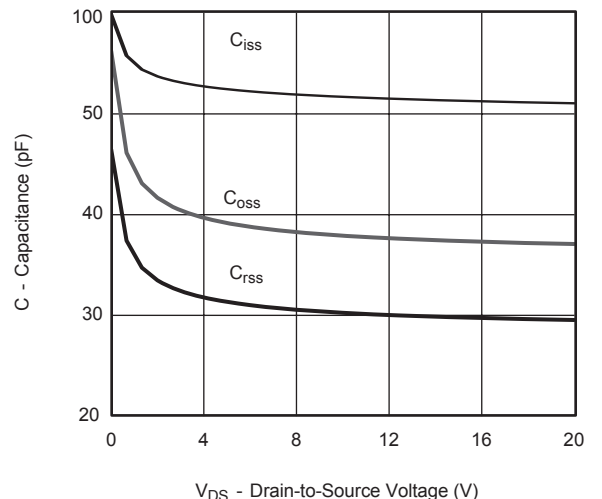
**Output Characteristics**



**Transfer Characteristics**

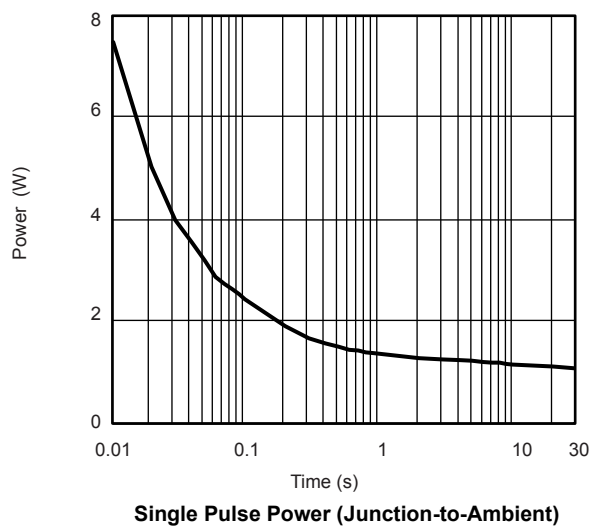
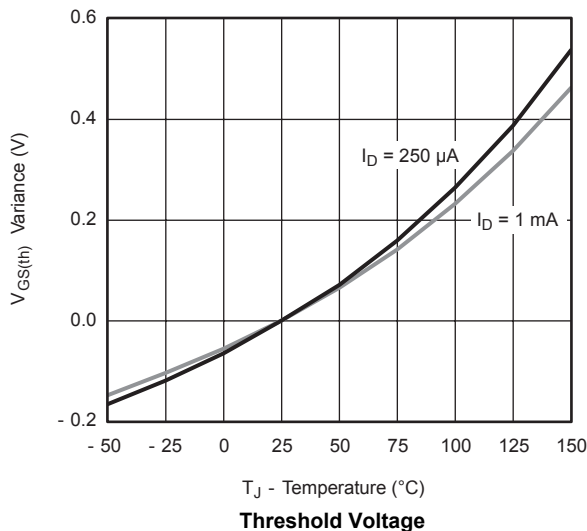
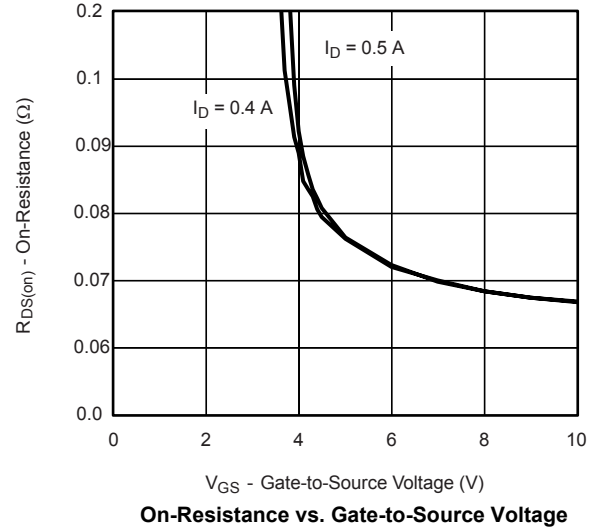
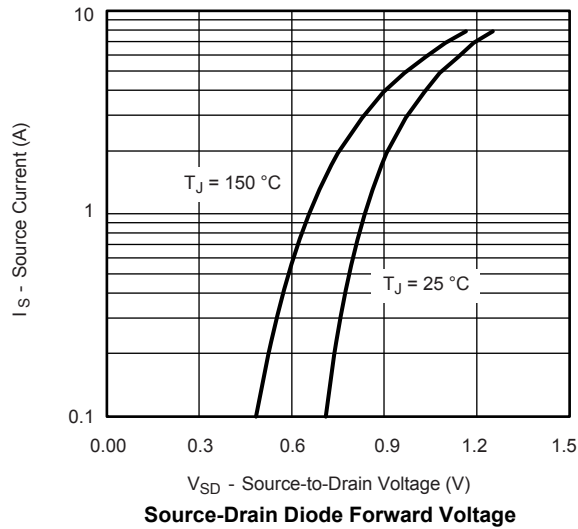
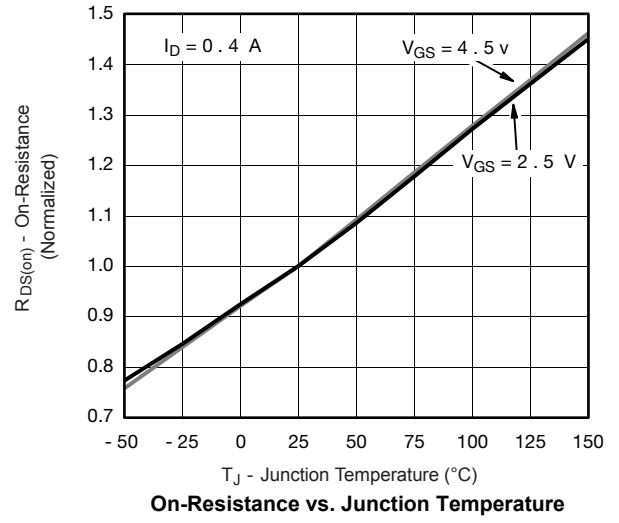
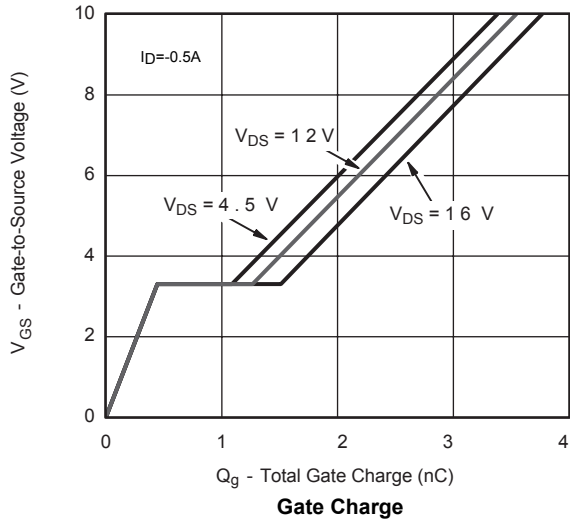


**On-Resistance vs. Drain Current**

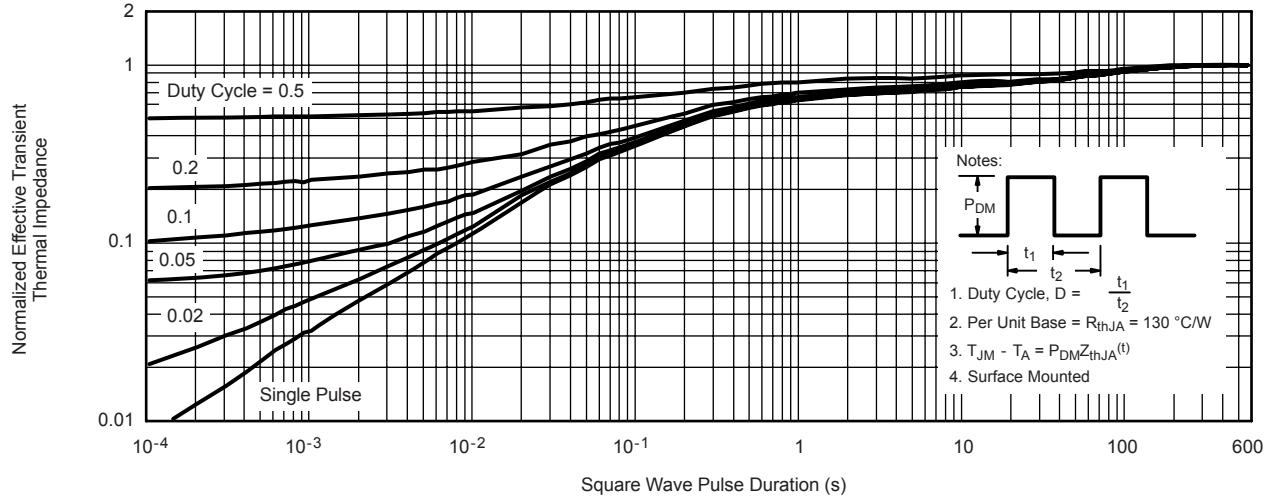


**Capacitance**

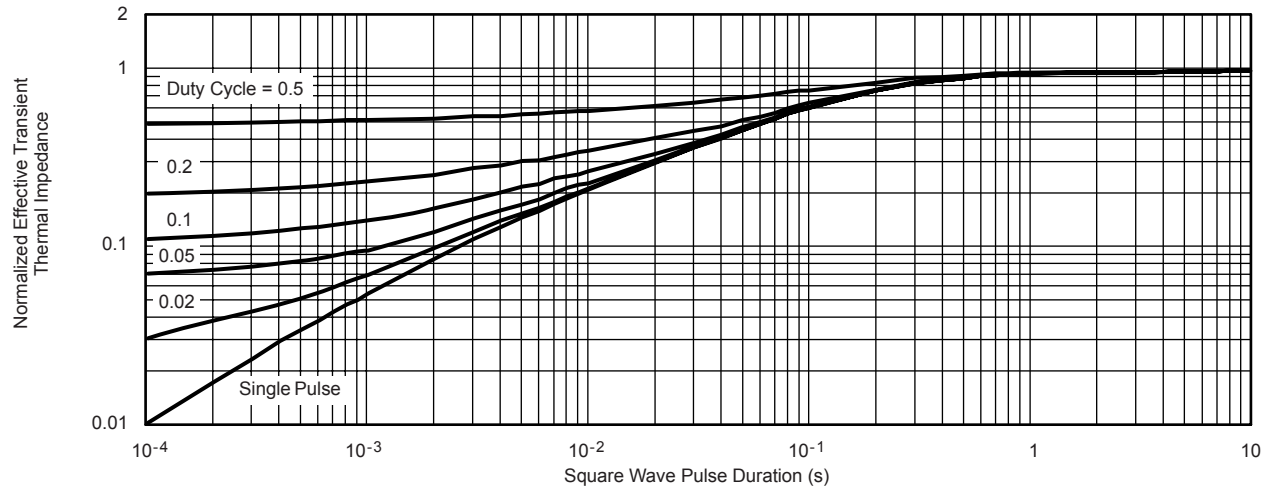
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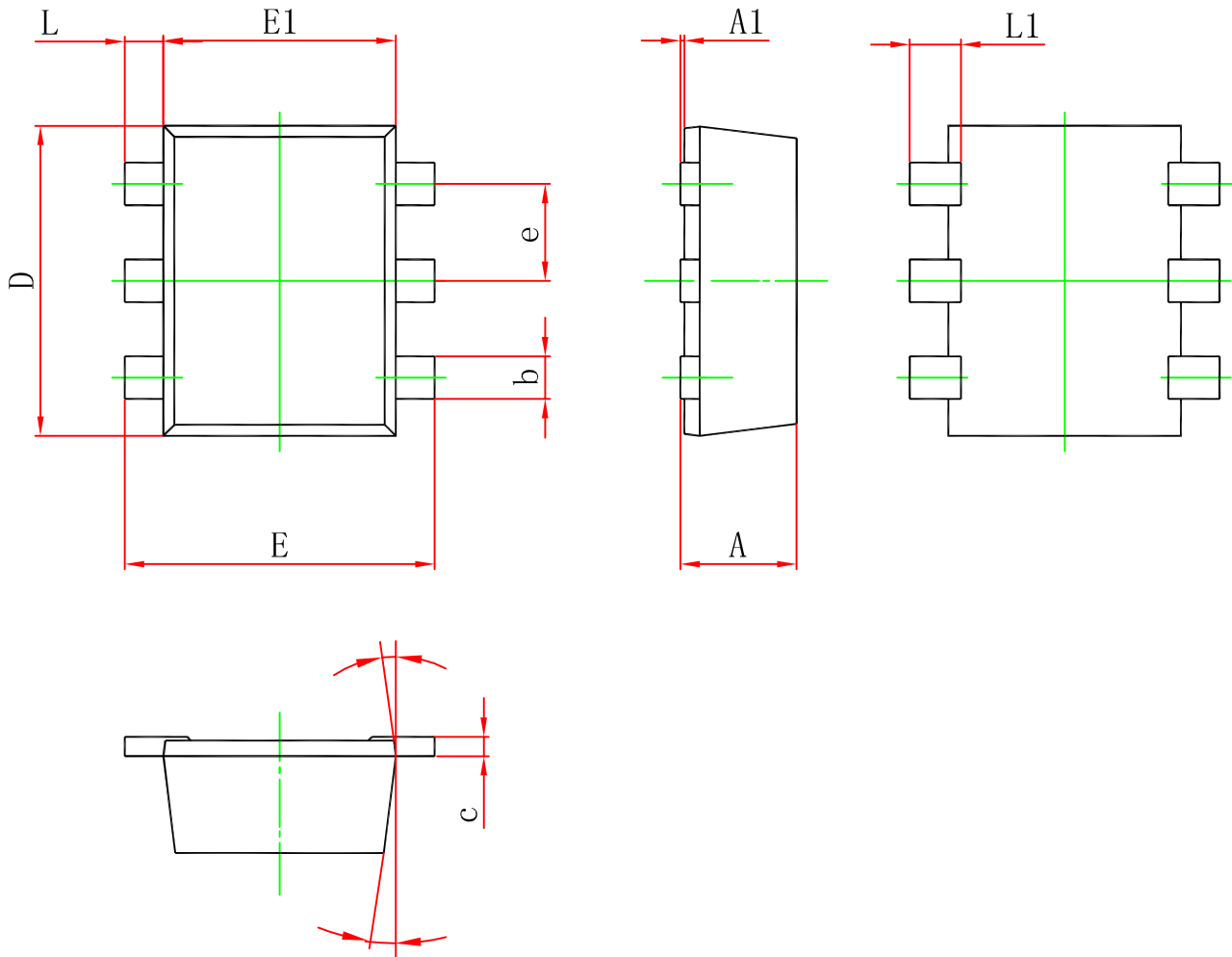


**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

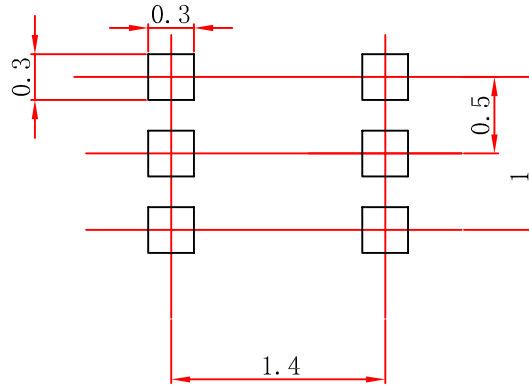
**SOT-563 PACKAGE OUTLINE DIMENSIONS**



Symbol	Dimensions In Millimeters		Dimensions in inches	
	Min.	Max.	Min.	Max.
A	0.525	0.600	0.021	0.024
A1	0.000	0.050	0.000	0.002
e	0.450	0.550	0.018	0.022
c	0.090	0.160	0.004	0.006
D	1.500	1.700	0.059	0.067
b	0.170	0.270	0.007	0.011
E1	1.100	1.300	0.043	0.051
E	1.500	1.700	0.059	0.067
L	0.100	0.300	0.004	0.012
L1	0.200	0.400	0.008	0.016
0	7 °REF.		7 °REF.	



**RECOMMENDED MINIMUM PADS FOR SOT-563**



1. Unit: mm
2. Package size: 1.6\*1.2
3. Tolerance:  $\pm 0.05$

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