

Dual N-Channel 20-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY

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	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
Channel-1	20	0.012 at V _{GS} = 10 V	9.6
		0.0175 at V _{GS} = 4.5 V	7.8
Channel-2		0.010 at V _{GS} = 10 V	13.5
		0.0115 at V _{GS} = 4.5 V	12.8

SCHOTTKY PRODUCT SUMMARY

V_{DS} (V)	V_{SD} (V) Diode Forward Voltage	I_F (A)
20	0.53 V at 3 A	2.0

FEATURES

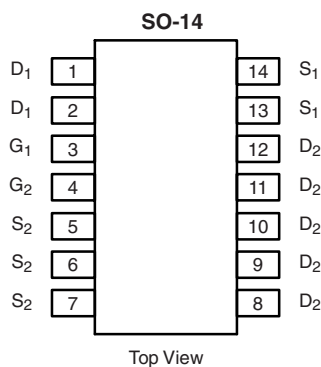
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



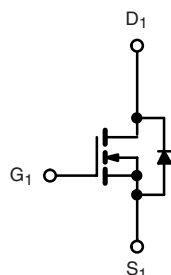
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

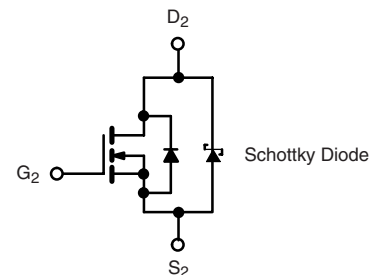
- DC/DC Converters
- Game Stations
- Notebook PC Logic



Ordering Information: Si4340DY-T1-E3 (Lead (Pb)-free)
Si4340DY-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel 1
MOSFET



N-Channel 2
MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Channel-1		Channel-2		Unit
		10 s	Steady State	10 s	Steady State	
Drain-Source Voltage	V_{DS}	20				V
Gate-Source Voltage	V_{GS}	± 20		± 16		
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	9.6	7.3	13.5	9.9	A
		7.7	5.8	10.8	7.5	
Pulsed Drain Current	I_{DM}	40		50		
Continuous Source Current (Diode Conduction) ^a	I_S	1.8	1.04	2.73	1.30	
Maximum Power Dissipation ^a	P_D	2.0	1.14	3.0	1.43	W
		1.28	0.73	1.9	0.91	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150				°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Channel-1		Channel-2		Schottky		Unit
		Typ.	Max.	Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^a	R_{thJA}	53	62.5	35	42	40	48	°C/W
		92	110	72	87	76	93	
Maximum Junction-to-Foot (Drain)	R_{thJF}	35	42	18	23	21	25	

Notes:

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

MOSFET SPECIFICATIONS T _J = 25 °C, unless otherwise noted							
Parameter	Symbol	Test Conditions		Min.	Typ. ^a	Max.	Unit
Static							
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	Ch-1 Ch-2	0.8 0.8		2.00 1.90	V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V V _{DS} = 0 V, V _{GS} = ± 12 V	Ch-1 Ch-2			100 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V V _{DS} = 20 V, V _{GS} = 0 V, T _J = 85 °C	Ch-1 Ch-2 Ch-1 Ch-2			1 100 15 4000	μA
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	Ch-1 Ch-2	20 30			A
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 9.6 A V _{GS} = 10 V, I _D = 13.5 A V _{GS} = 4.5 V, I _D = 7.8 A V _{GS} = 4.5 V, I _D = 12.8 A	Ch-1 Ch-2 Ch-1 Ch-2		0.0095 0.007 0.0135 0.0085	0.012 0.010 0.0175 0.0115	Ω
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 9.6 A V _{DS} = 15 V, I _D = 13.5 A	Ch-1 Ch-2		25 38		S
Diode Forward Voltage ^b	V _{SD}	I _S = 1.8 A, V _{GS} = 0 V I _S = 2.73 A, V _{GS} = 0 V	Ch-1 Ch-2		0.74 0.485	1.1 0.53	V
Dynamic ^a							
Total Gate Charge	Q _g	Channel-1 V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 9.6 A	Ch-1 Ch-2		10 17	15 25	nC
Gate-Source Charge	Q _{gs}	Channel-2	Ch-1 Ch-2		3.3 4.5		
Gate-Drain Charge	Q _{gd}	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = - 13.5 A	Ch-1 Ch-2		3.1 4.5		
Gate Resistance	R _g	f = 1 MHz	Ch-1 Ch-2	0.45 0.7	0.9 1.4	1.35 2.1	
Turn-On Delay Time	t _{d(on)}	Channel-1 V _{DD} = 10 V, R _L = 10 Ω I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 6 Ω	Ch-1 Ch-2		15 24	25 35	ns
Rise Time	t _r		Ch-1 Ch-2		16 22	25 35	
Turn-Off Delay Time	t _{d(off)}	Channel-2 V _{DD} = 10 V, R _L = 10 Ω	Ch-1 Ch-2		42 68	65 100	
Fall Time	t _f	I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 6 Ω	Ch-1 Ch-2		16 19	25 30	
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 1.8 A, dI/dt = 100 A/μs	Ch-1		35	60	
		I _F = 2.73 A, dI/dt = 100 μA/μs	Ch-2		38	65	

Notes:

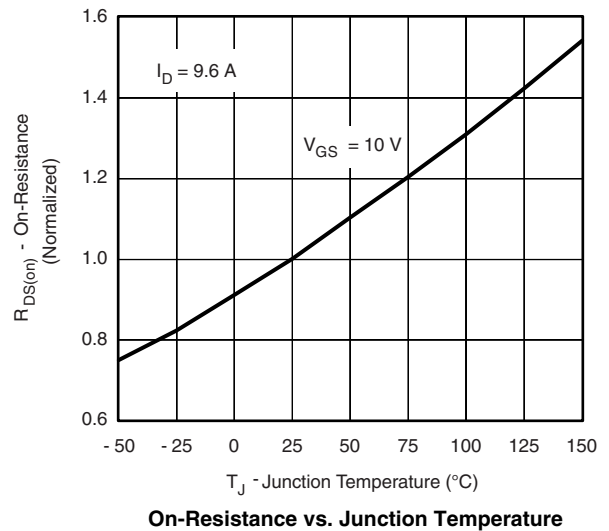
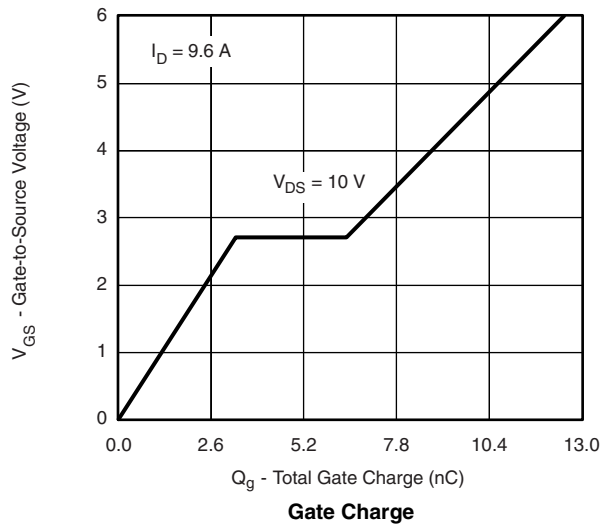
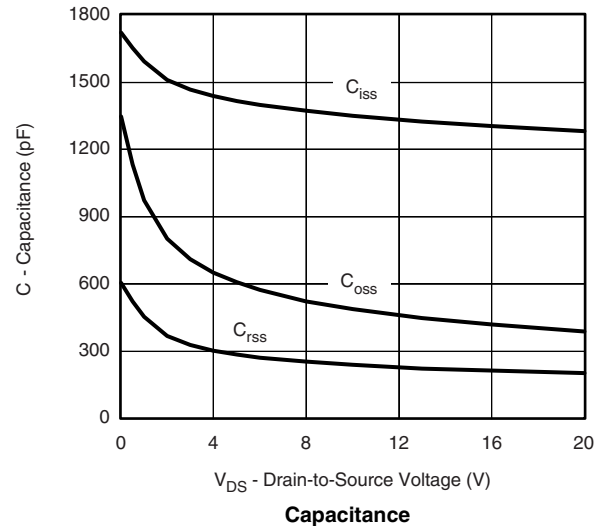
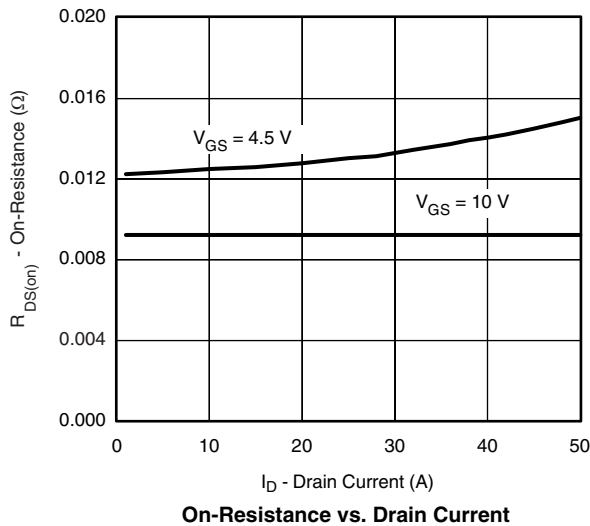
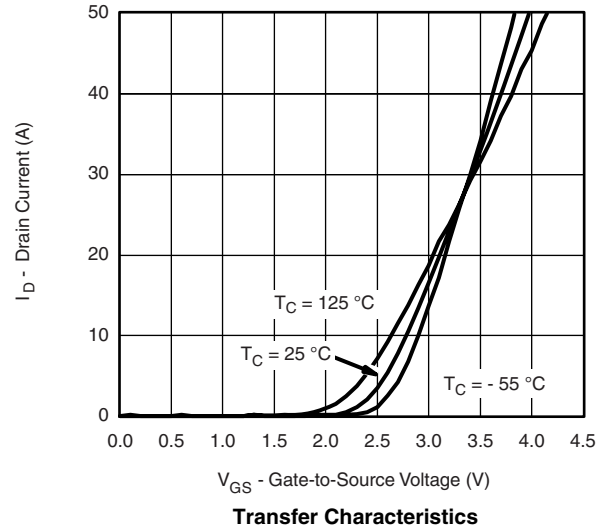
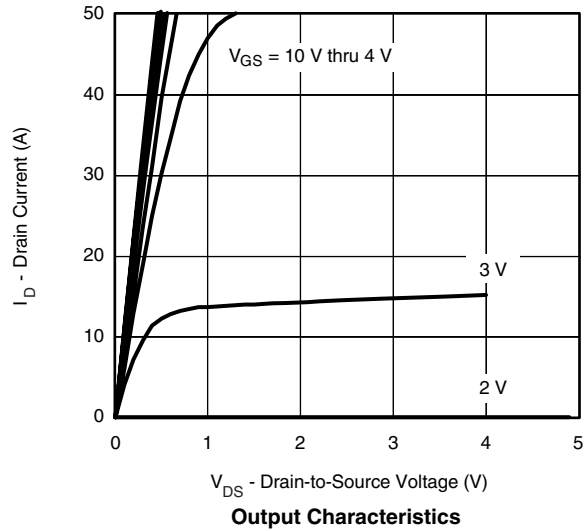
a. Guaranteed by design, not subject to production testing.

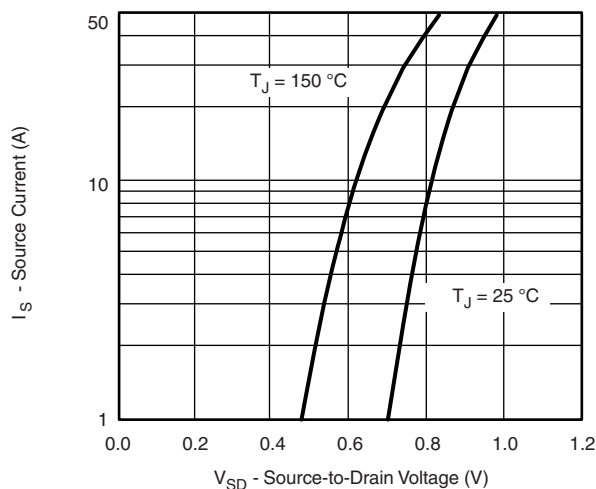
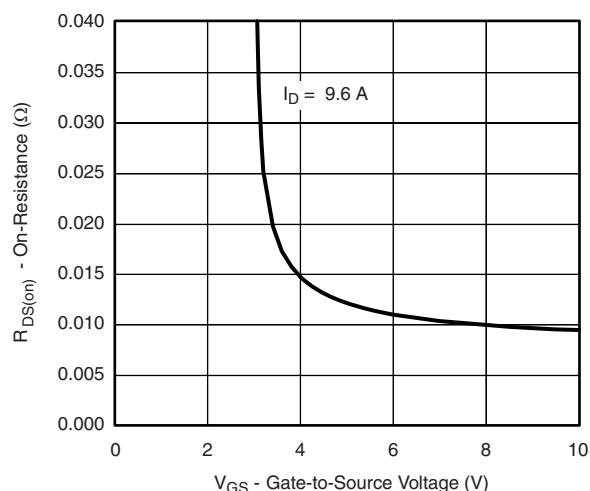
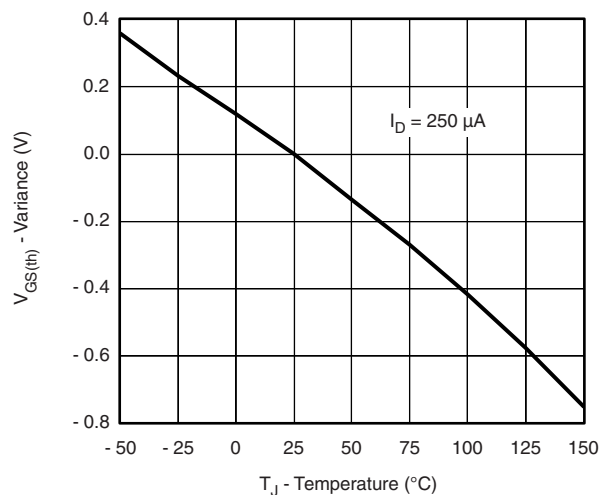
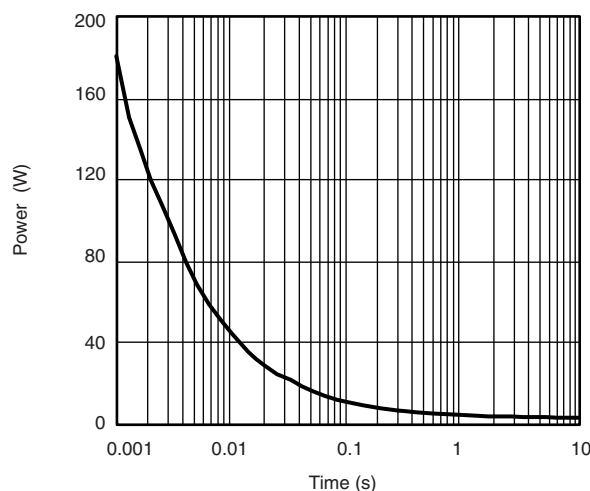
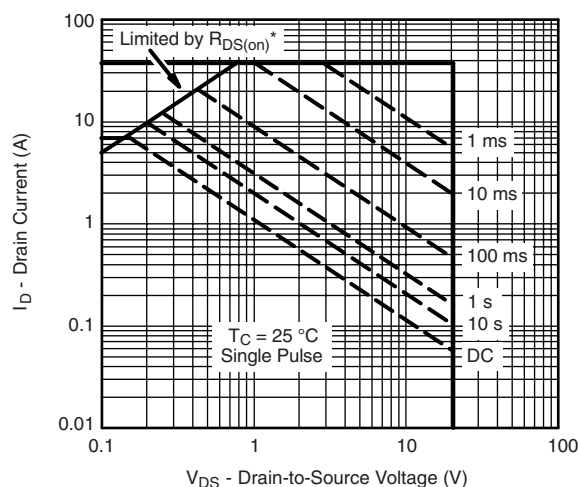
b. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

SCHOTTKY SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$I_F = 3\ \text{A}$			0.485	0.53	V
		$I_F = 3\ \text{A}$, $T_J = 125^\circ\text{C}$			0.42	0.42	
Maximum Reverse Leakage Current	I_{rm}	$V_R = 20\ \text{V}$			0.008	0.100	mA
		$V_R = 20\ \text{V}$, $T_J = 75^\circ\text{C}$			0.4	5	
		$V_R = -20\ \text{V}$, $T_J = 125^\circ\text{C}$			6.5	20	
Junction Capacitance	C_T	$V_R = 15\ \text{V}$			102		pF

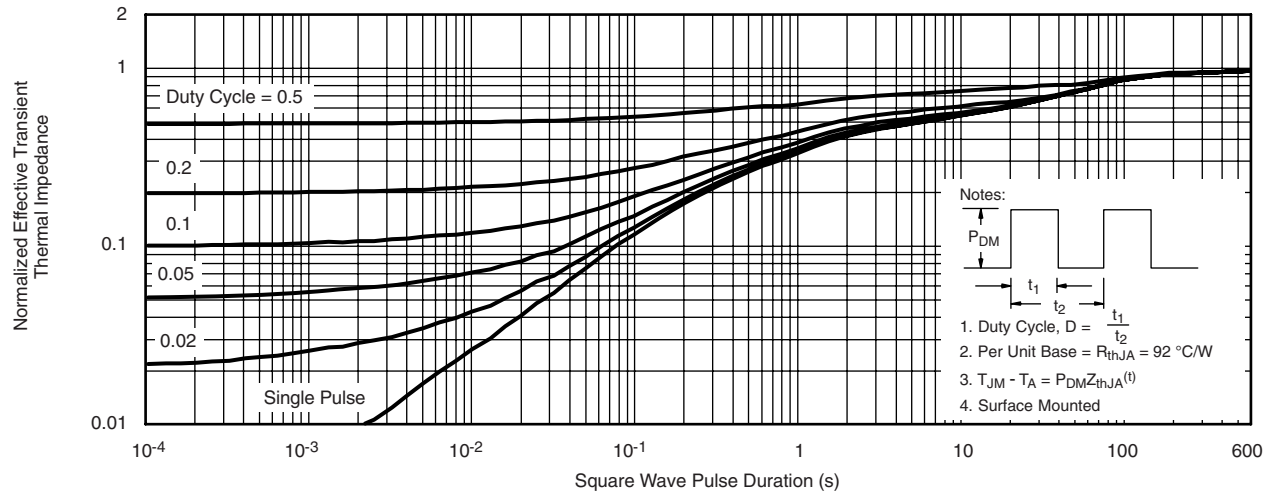
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

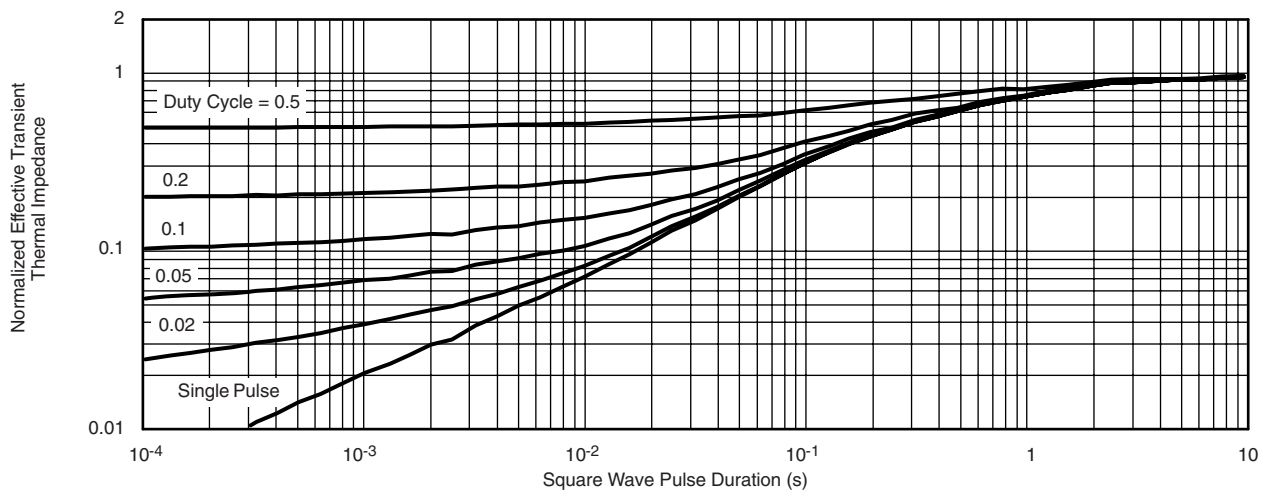


CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Source-Drain Diode Forward Voltage****On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area, Junction-to-Case**

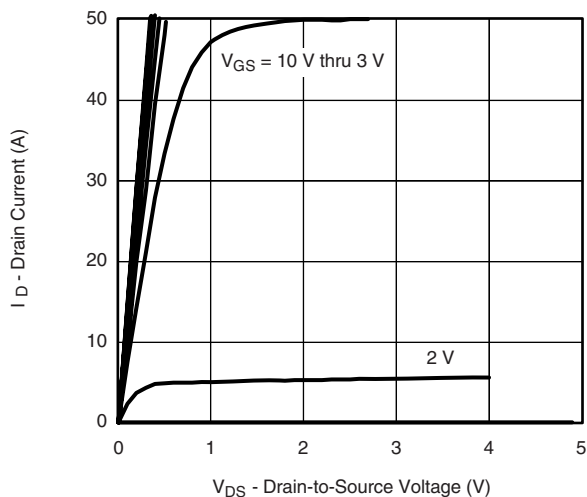
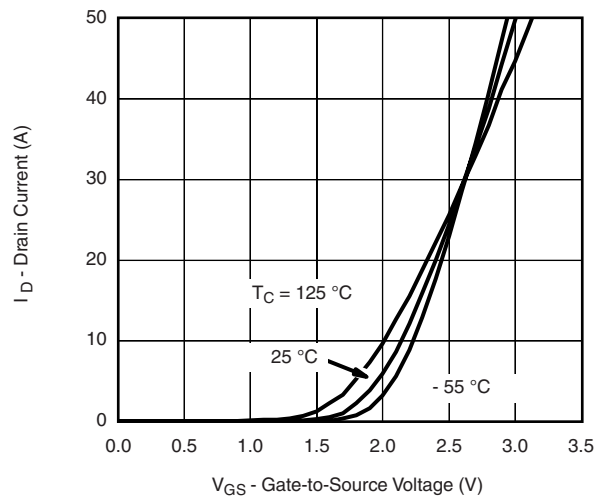
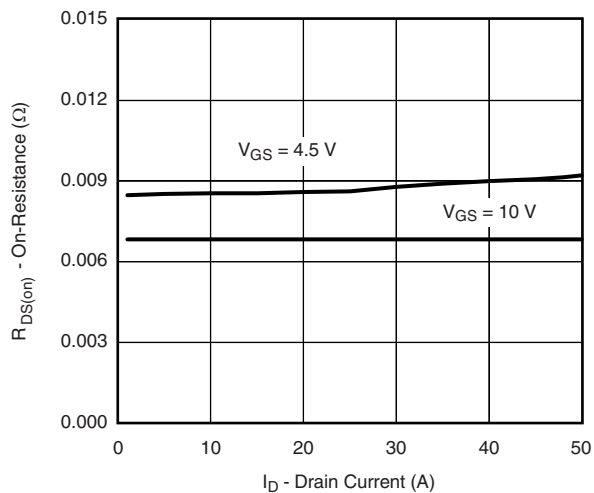
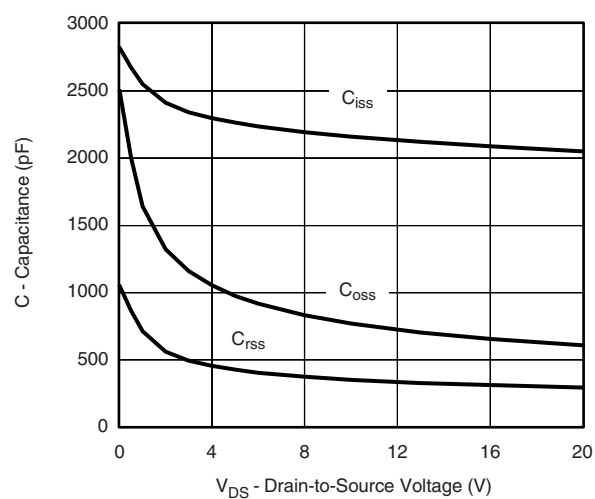
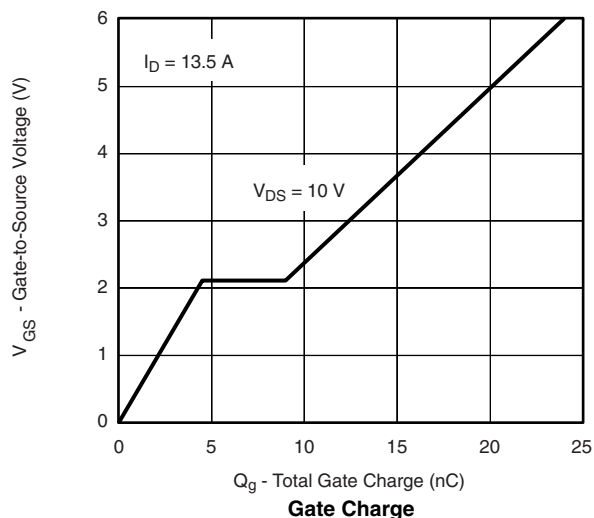
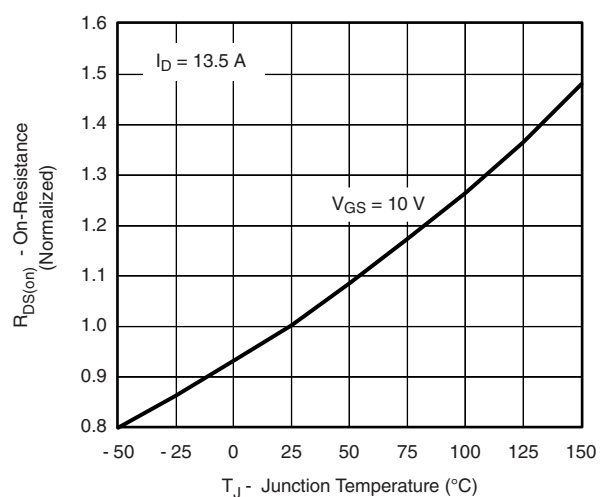
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



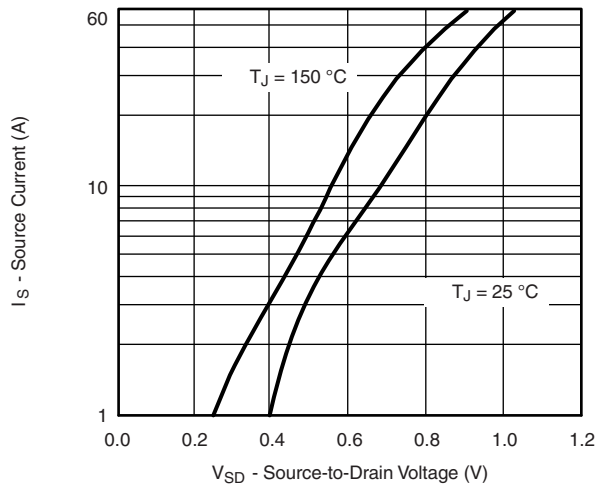
Normalized Thermal Transient Impedance, Junction-to-Ambient



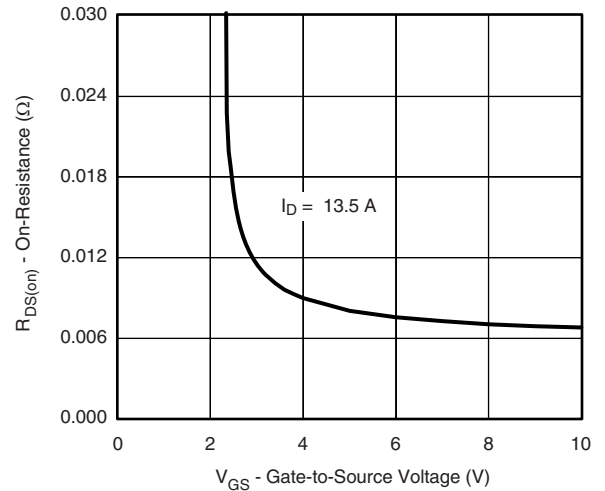
Normalized Thermal Transient Impedance, Junction-to-Foot

CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

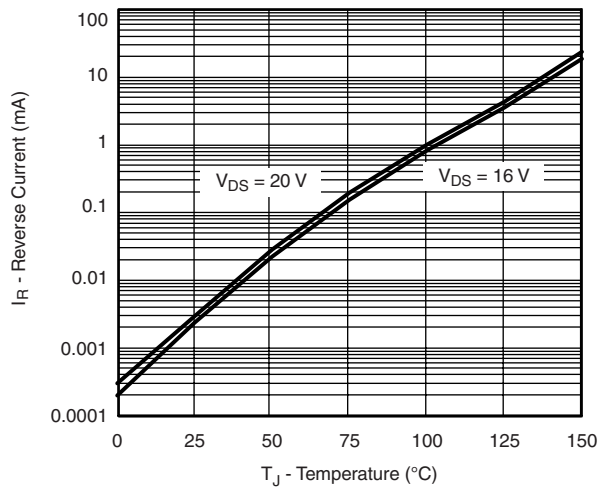
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



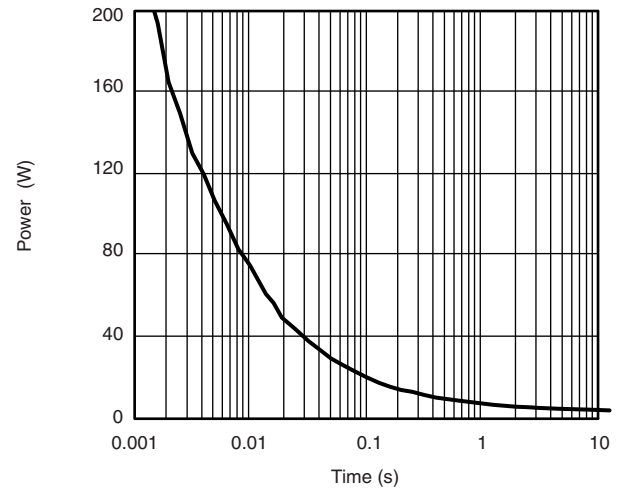
Source-Drain Diode Forward Voltage



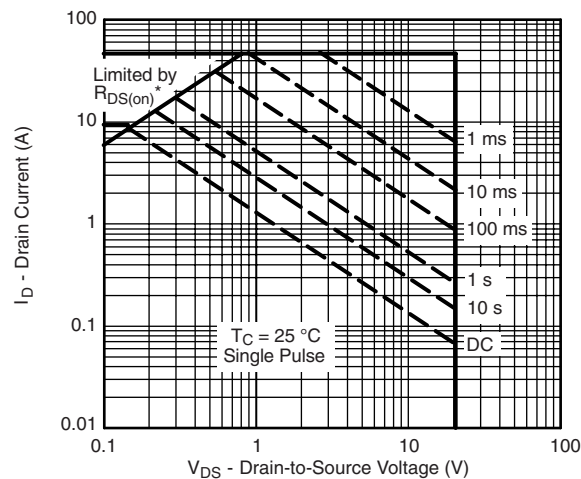
On-Resistance vs. Gate-to-Source Voltage



Reverse Current vs. Junction Temperature

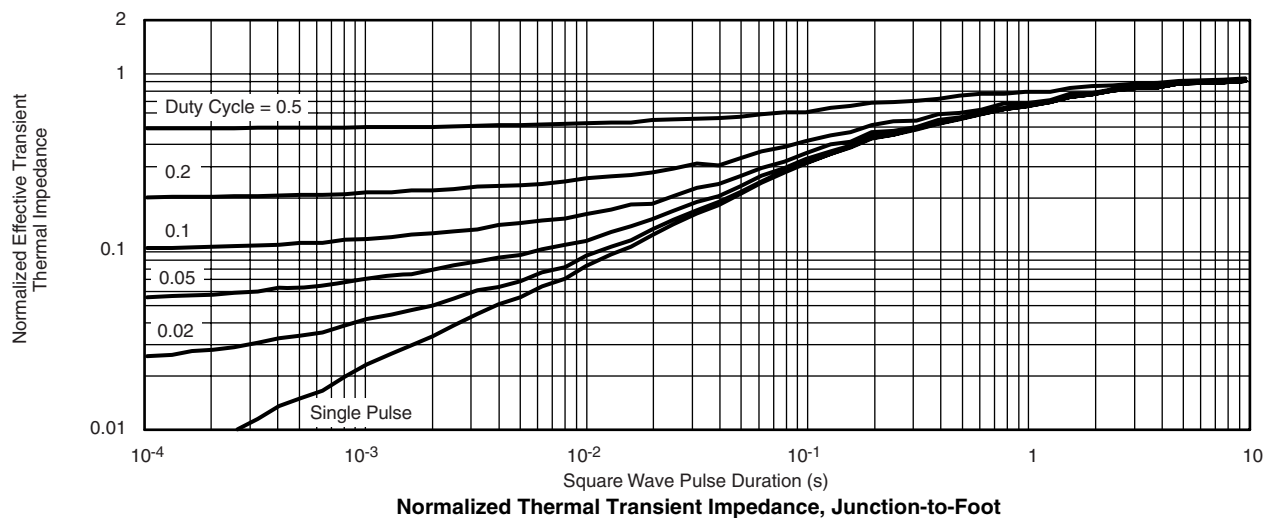
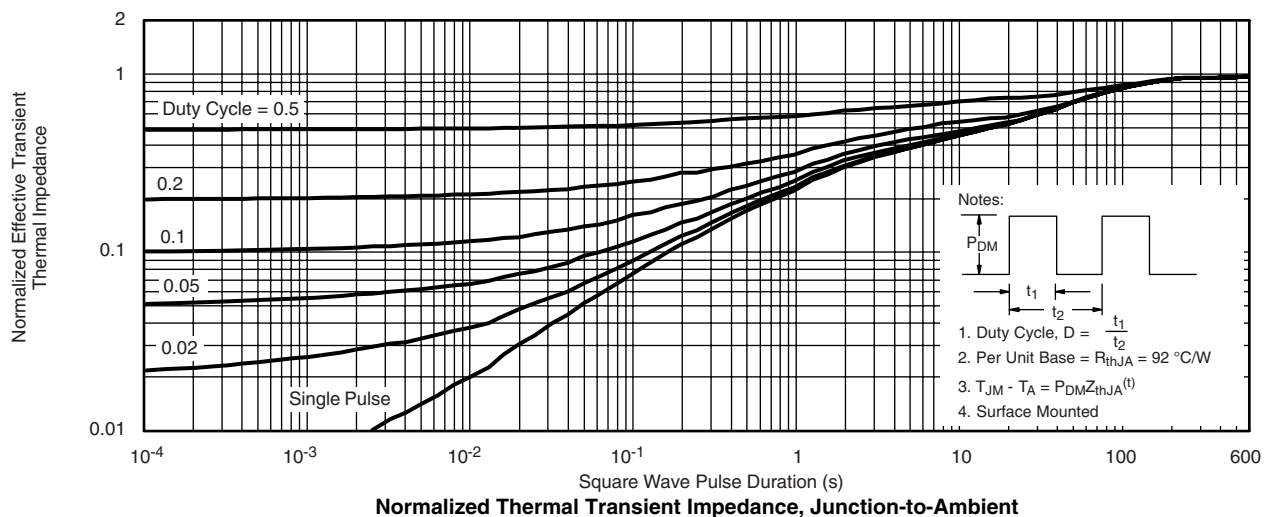
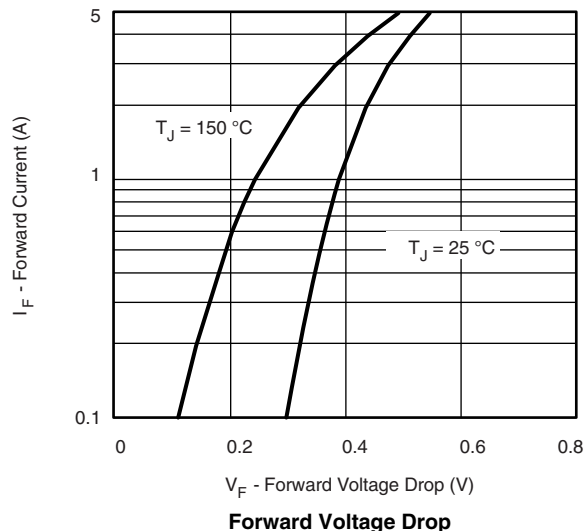
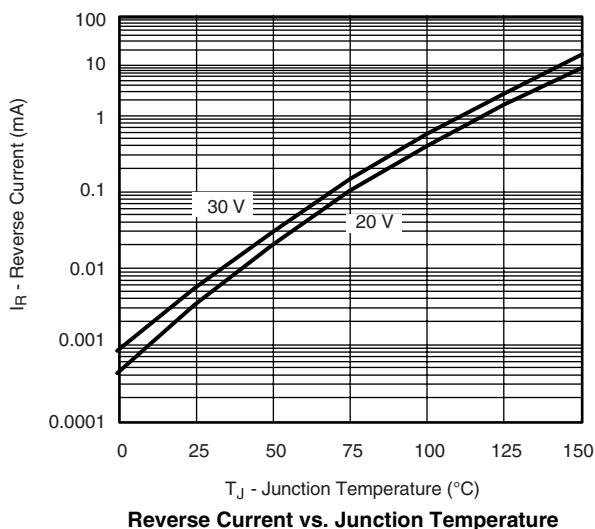


Single Pulse Power

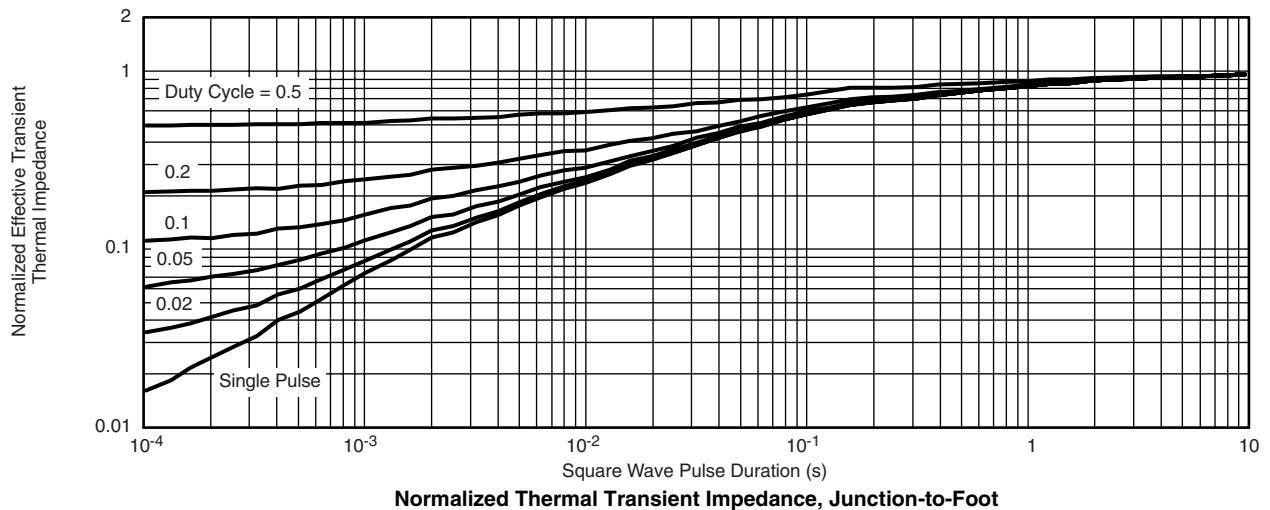
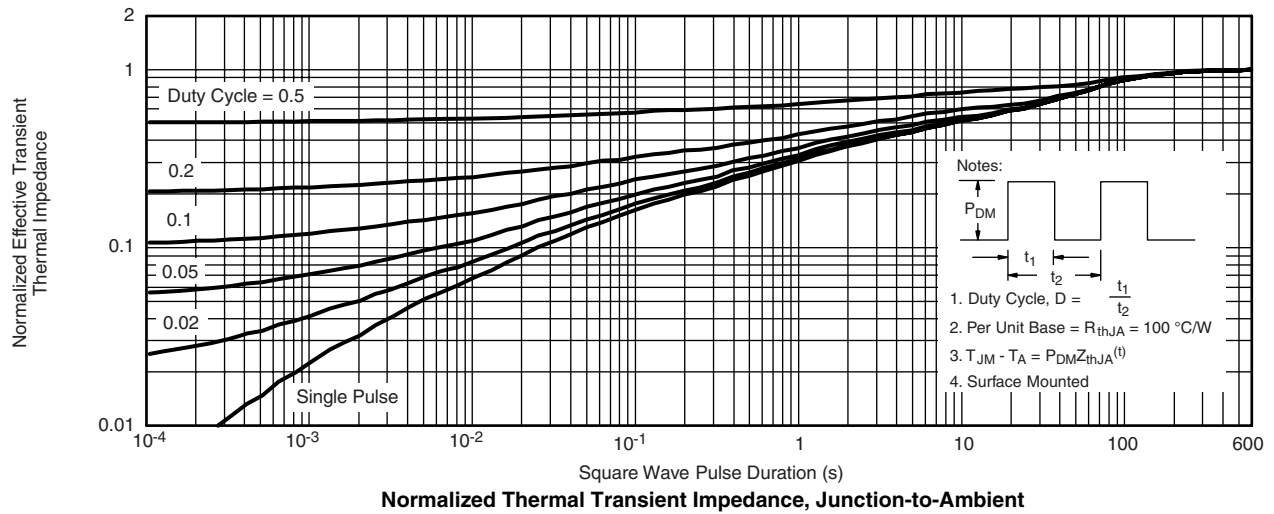
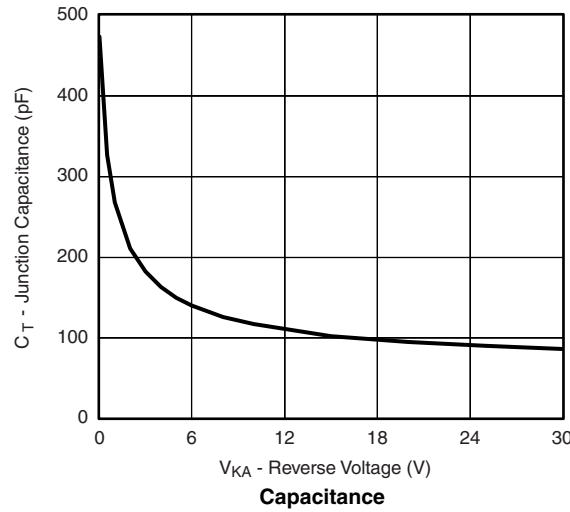


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case

CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**SCHOTTKY TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

SCHOTTKY TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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