Dual N-Channel 30-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY			
	V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
Channel-1	30	0.023 at V_{GS} = 10 V	7.0
		0.032 at V_{GS} = 4.5 V	5.6
Channel-2		0.020 at V_{GS} = 10 V	7.4
		0.027 at V_{GS} = 4.5 V	6.4

SCHOTTKY PRODUCT SUMMARY		
V_{DS} (V)	V_{SD} (V) Diode Forward Voltage	I_F (A)
30	0.40 V at 1.0 A	2.0

FEATURES

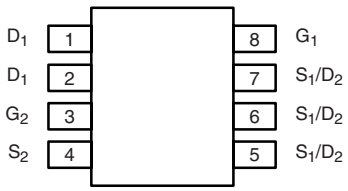
- LITTLE FOOT® *Plus* Integrated Schottky
- 100 % R_g Tested

Pb-free
RoHS COMPLIANT

APPLICATIONS

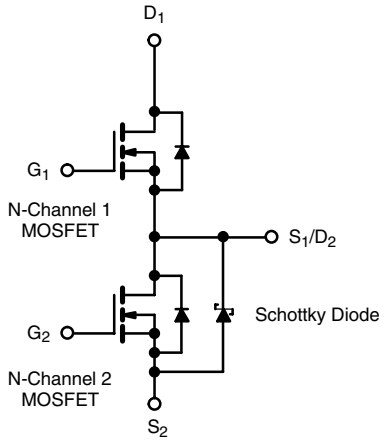
- Logic DC/DC
  - Notebook PC

SO-8



Top View

Ordering Information: Si4914DY-T1-E3 (Lead (Pb)-free)



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

Parameter		Symbol	Channel-1		Channel-2		Unit
			10 sec	Steady State	10 sec	Steady State	
Drain-Source Voltage		V_{DS}	30				V
Gate-Source Voltage		V_{GS}	20				
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	7.0	5.5	7.4	5.7	A
	T_A = 70 °C		5.6	4.3	6	4.5	
Pulsed Drain Current		I_{DM}	40		40		
Continuous Source Current (Diode Conduction)[a]		I_S	1.7	1.0	1.8	0.95	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	13		15		
Avalanche Energy		E_{AS}	8.45		11		mJ
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	1.9	1.1	2.0	1.16	W
	T_A = 70 °C		1.2	0.71	1.3	0.74	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150				°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Channel-1		Channel-2		Unit
			Typ	Max	Typ	Max	
Maximum Junction-to-Ambient[a]	t ≤ 10 sec	R_{thJA}	52	65	47	60	°C/W
	Steady State		90	112	85	107	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	30	38	28	35	

Notes:
a. Surface Mounted on 1" x 1" FR4 Board.

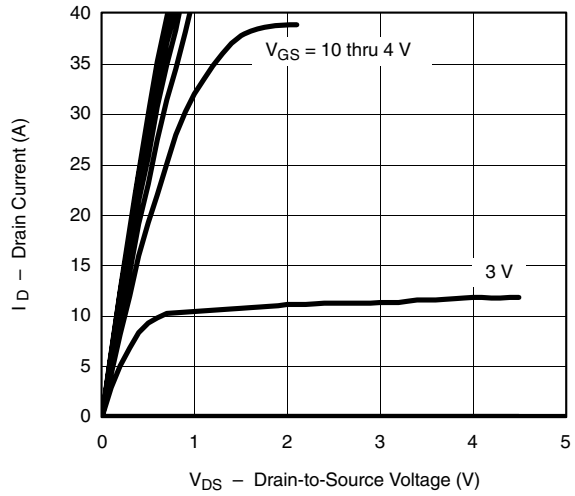
MOSFET SPECIFICATIONS T_J = 25 °C, unless otherwise noted							
Parameter	**Symbol**	**Test Conditions**		**Min**	**Typ[a]**	**Max**	**Unit**
Static							
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	Ch-1	1.0		2.5	V
			Ch-2	1.0		2.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V	Ch-1			100	nA
			Ch-2			100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V	Ch-1			1	µA
			Ch-2			500	
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 85 °C	Ch-1			0.015	mA
			Ch-2			20	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	Ch-1	20			A
			Ch-2	20			
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 7.0 A	Ch-1		0.019	0.023	Ω
		V_{GS} = 10 V, I_D = 7.4 A	Ch-2		0.016	0.020	
		V_{GS} = 4.5 V, I_D = 5.6 A	Ch-1		0.026	0.032	
		V_{GS} = 4.5 V, I_D = 6.4 A	Ch-2		0.022	0.027	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 7.0 A	Ch-1		19		S
		V_{DS} = 15 V, I_D = 7.4 A	Ch-2		22		
Diode Forward Voltage[b]	V_{SD}	I_S = 1.7 A, V_{GS} = 0 V	Ch-1		0.75	1.1	V
		I_S = 1 A, V_{GS} = 0 V	Ch-2		0.36	0.40	
Dynamic[a]							
Total Gate Charge	Q_g	Channel-1 V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 7.0 A Channel-2 V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 7.4 A	Ch-1		5.6	8.5	nC
			Ch-2		7.3	11	
Gate-Source Charge	Q_{gs}		Ch-1		2.3		
			Ch-2		2.8		
Gate-Drain Charge	Q_{gd}		Ch-1		1.7		
			Ch-2		2.2		
Gate Resistance	R_g		Ch-1	0.5	2.3	3.6	Ω
			Ch-2	0.5	1.6	2.5	
Turn-On Delay Time	$t_{d(on)}$	Channel-1 V_{DD} = 15 V, R_L = 15 Ω $I_D \cong$ 1 A, V_{GEN} = 10 V, R_g = 6 Ω Channel-2 V_{DD} = 15 V, R_L = 15 Ω $I_D \cong$ 1 A, V_{GEN} = 10 V, R_g = 6 Ω	Ch-1		6	10	ns
			Ch-2		7	11	
Rise Time	t_r		Ch-1		13	20	
			Ch-2		13	20	
Turn-Off Delay Time	$t_{d(off)}$		Ch-1		27	40	
			Ch-2		35	53	
Fall Time	t_f		Ch-1		9	15	
			Ch-2		10	15	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.3 A, di/dt = 100 A/µs	Ch-1		30	50	
		I_F = 2.2 A, di/dt = 100 µA/µs	Ch-2		30	50	

Notes:
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

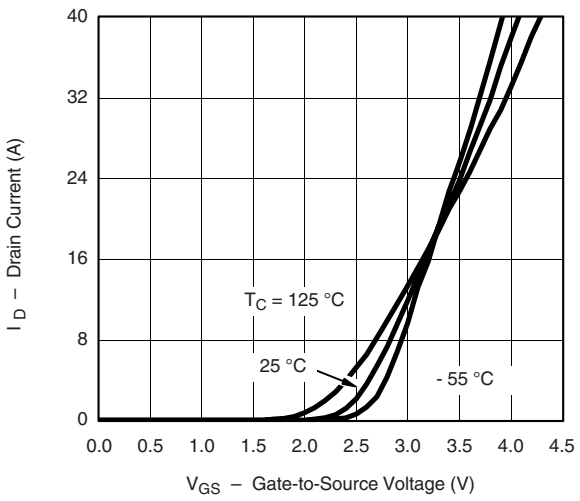
SCHOTTKY SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min**	**Typ**	**Max**	**Unit**
Forward Voltage Drop	V_F	I_F = 1.0 A		0.36	0.40	V
		I_F = 1.0 A, T_J = 150 °C		0.27	0.31	
Maximum Reverse Leakage Current	I_{rm}	V_r = 30 V		0.008	0.50	mA
		V_r = 30 V, T_J = 100 °C		3.5	10	
		V_r = - 30 V, T_J = 125 °C		10	100	
Junction Capacitance	C_T	V_r = 10 V		58		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.

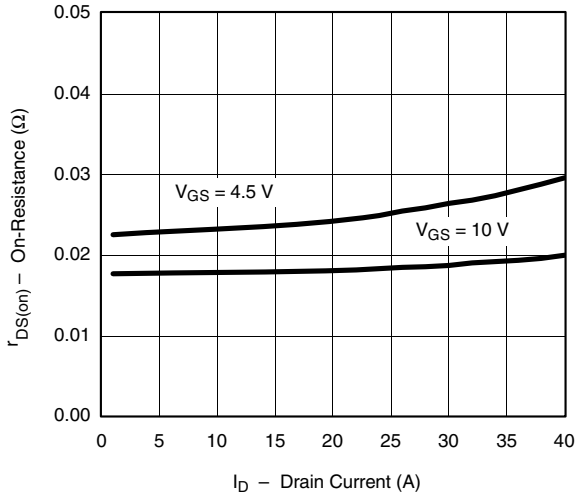
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless noted



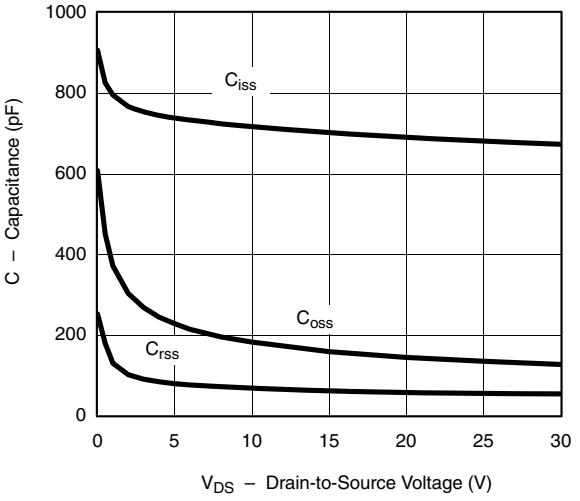
Output Characteristics



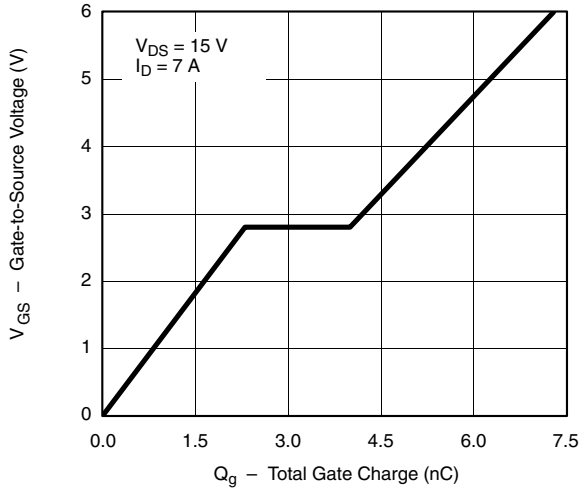
Transfer Characteristics



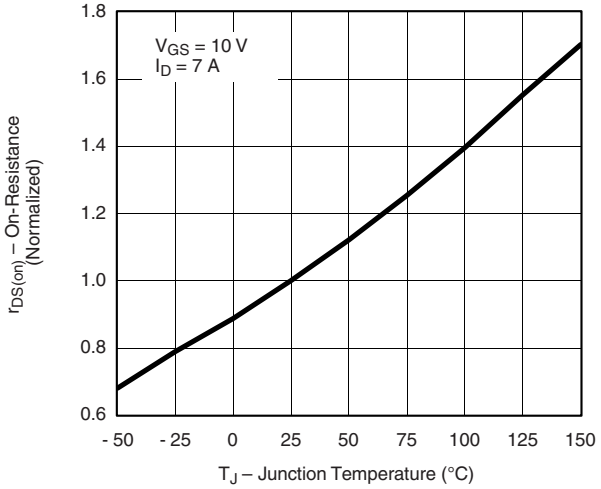
On-Resistance vs. Drain Current



Capacitance

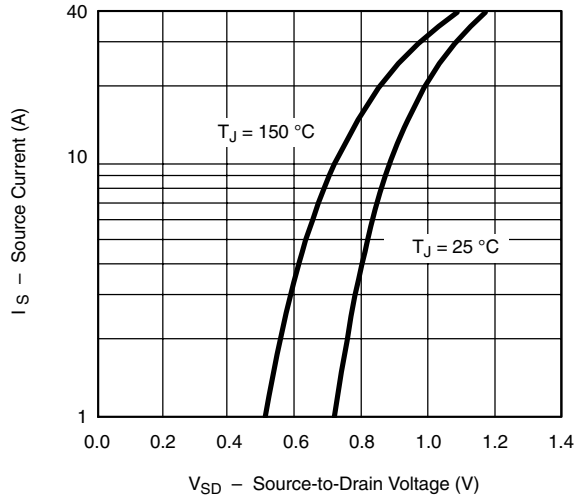


Gate Charge

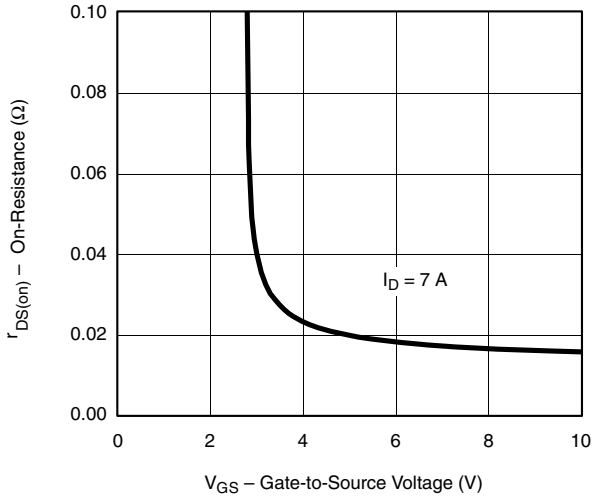


On-Resistance vs. Junction Temperature

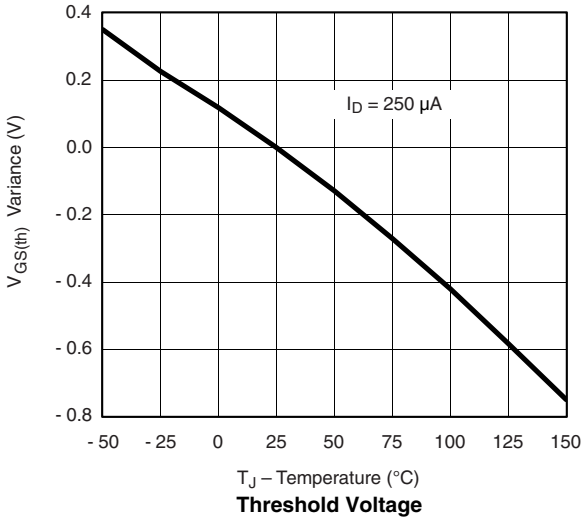
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless noted



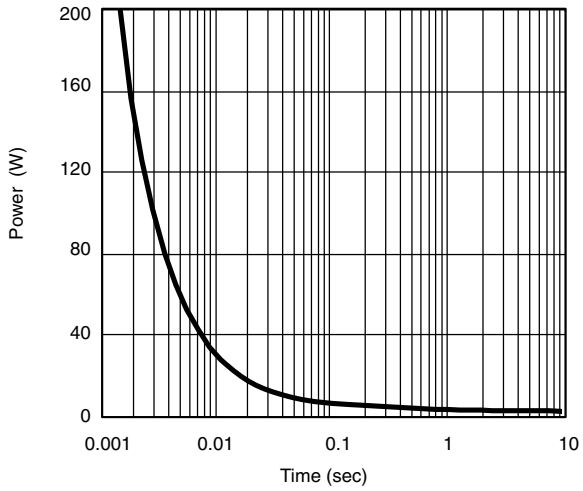
Source-Drain Diode Forward Voltage



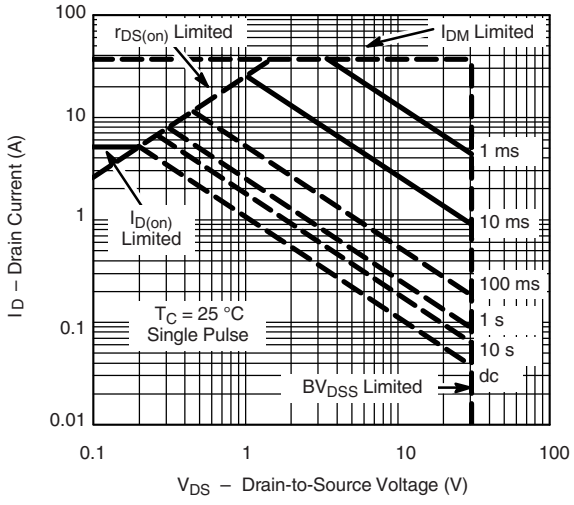
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

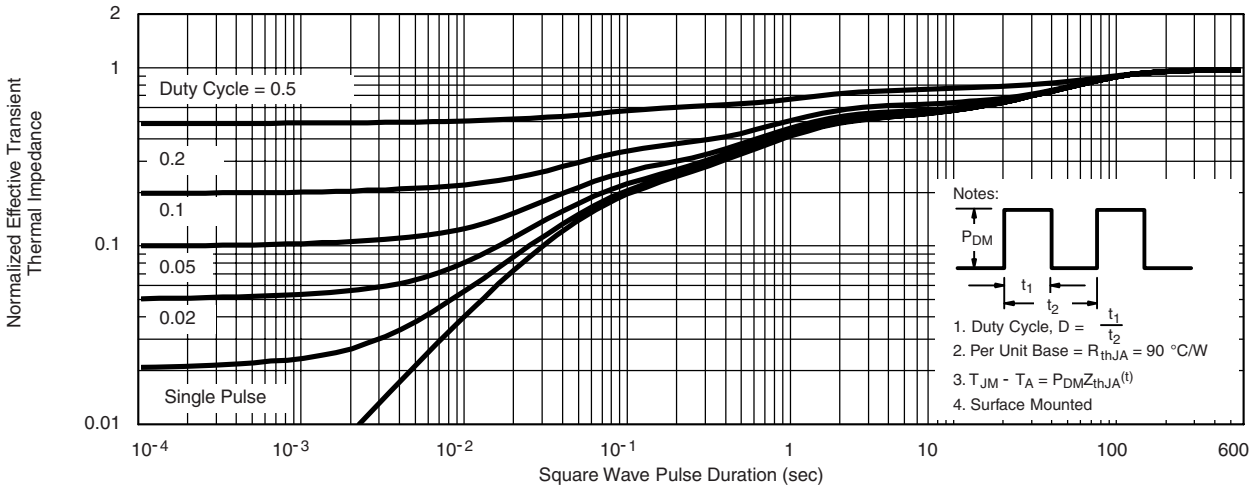


Single Pulse Power, Junction-to-Ambient

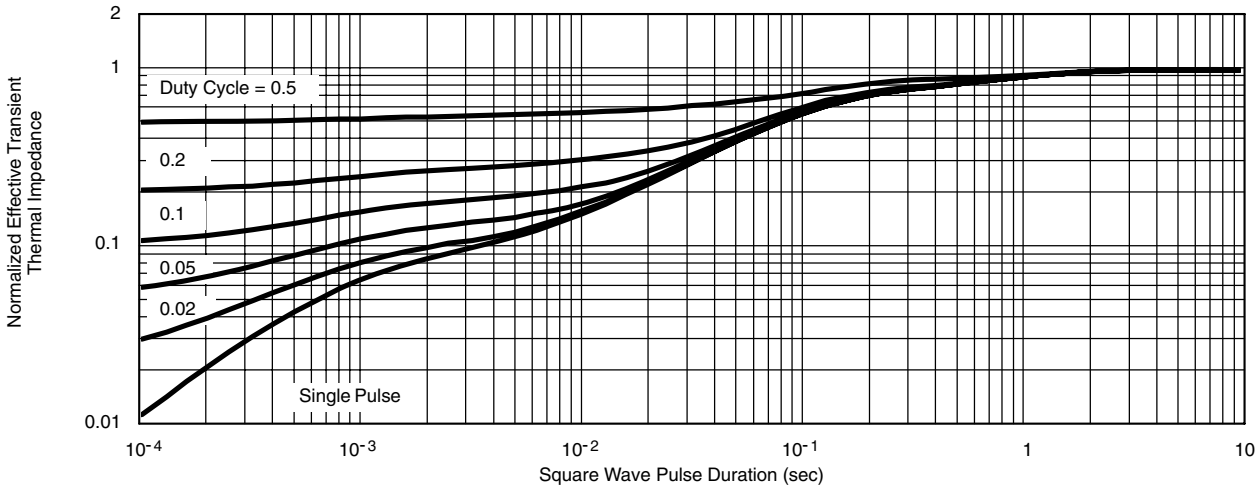


Safe Operating Area

CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless noted

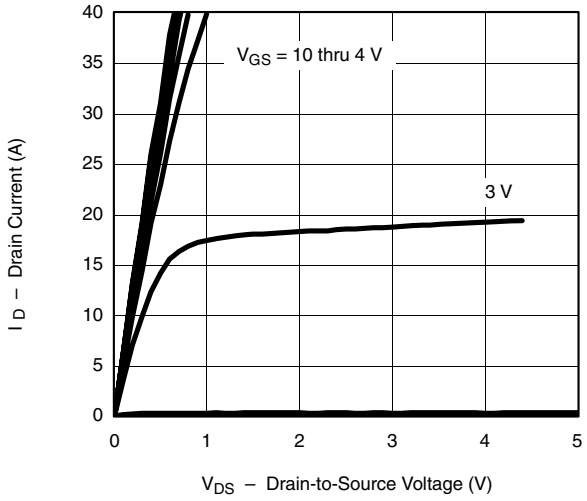


Normalized Thermal Transient Impedance, Junction-to-Ambient

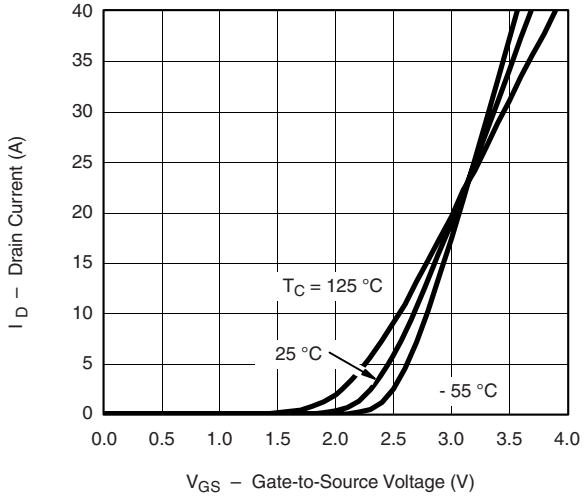


Normalized Thermal Transient Impedance, Junction-to-Foot

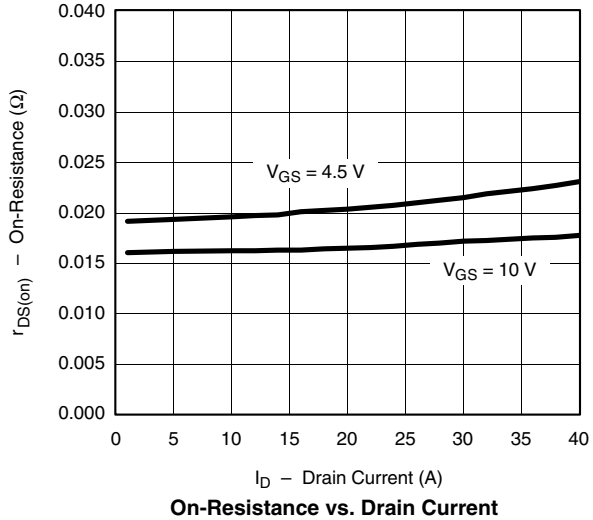
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless noted



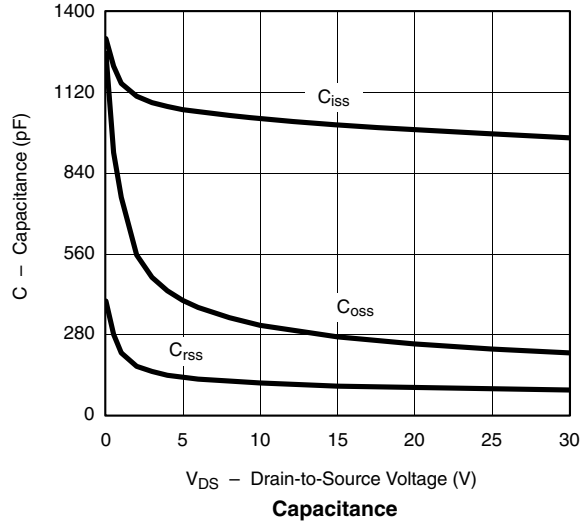
Output Characteristics



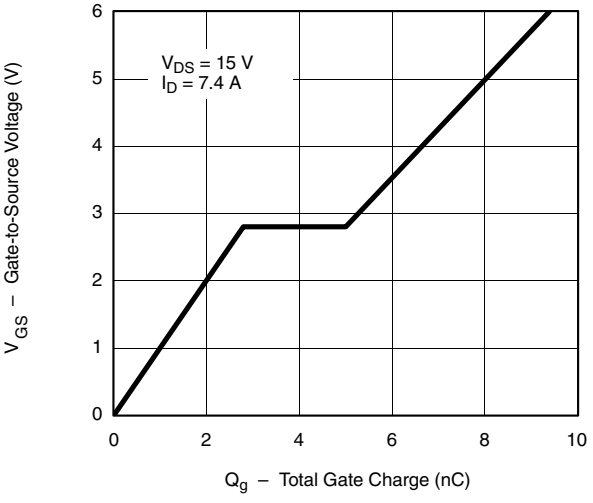
Transfer Characteristics



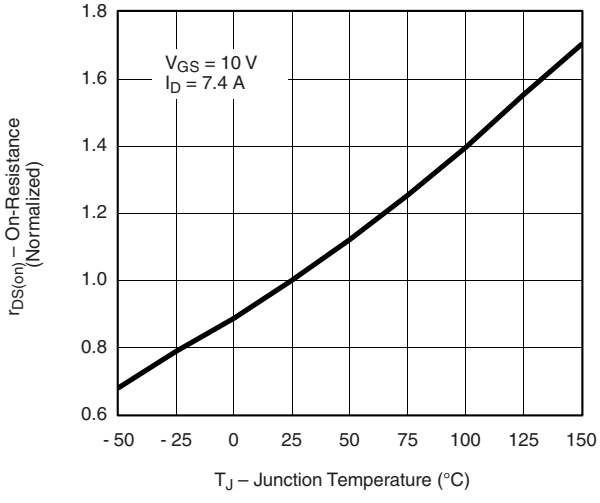
On-Resistance vs. Drain Current



Capacitance

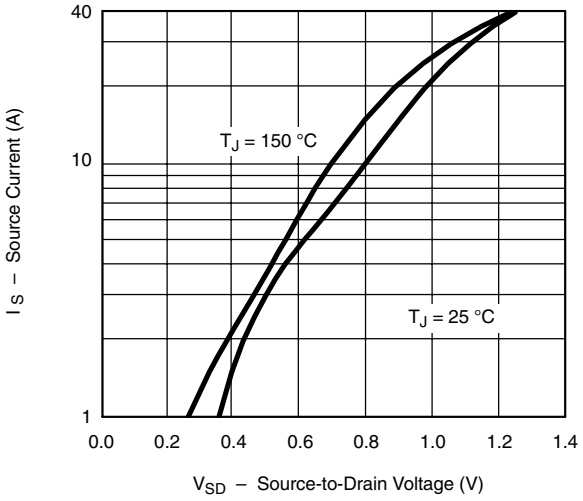


Gate Charge

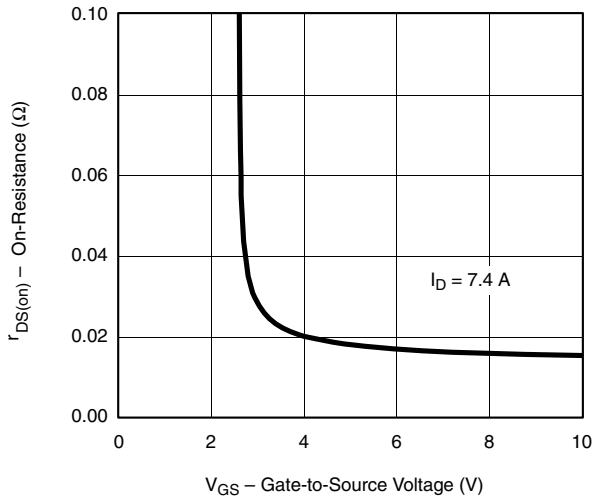


On-Resistance vs. Junction Temperature

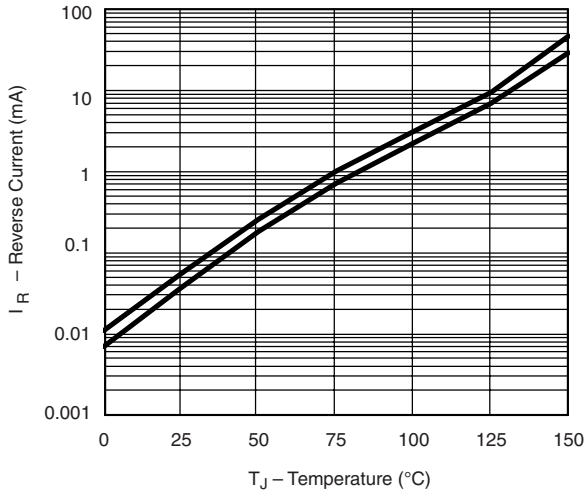
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless noted



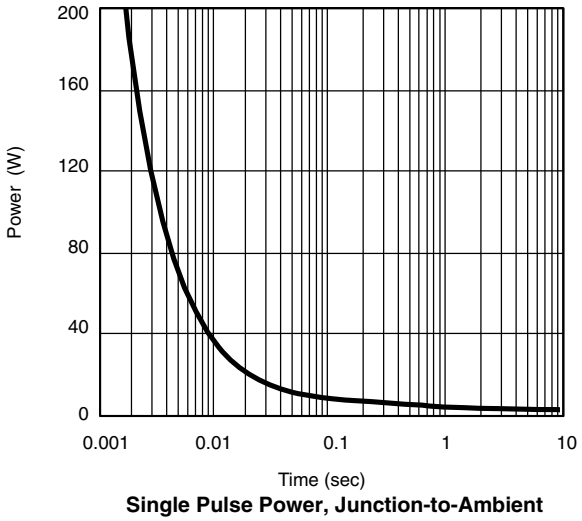
Source-Drain Diode Forward Voltage



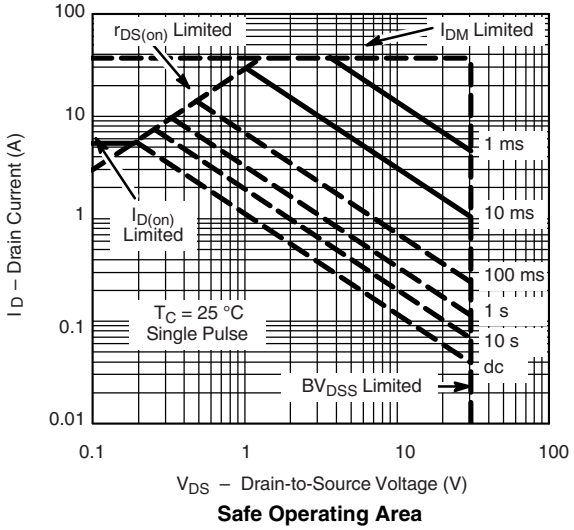
On-Resistance vs. Gate-to-Source Voltage



Reverse Current vs. Junction Temperature



Single Pulse Power, Junction-to-Ambient

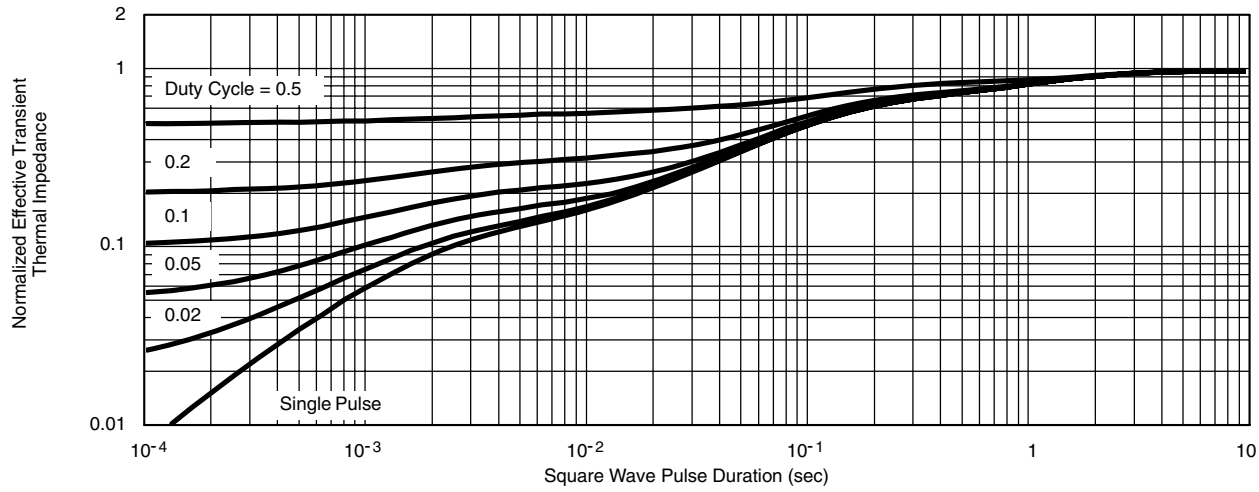


Safe Operating Area

CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see http://www.vishay.com/ppg?72938.

Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.