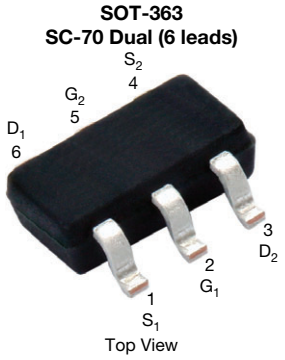
N- and P-Channel 30 V (D-S) MOSFET



Marking code: RI

FEATURES

- TrenchFET® power MOSFET
- 100 % R_g tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

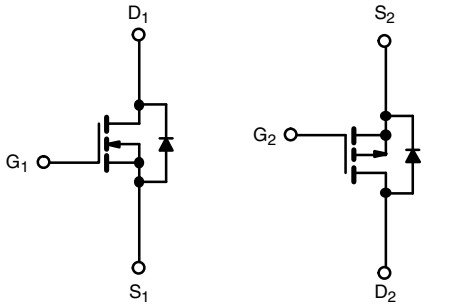
Pb-free

RoHS COMPLIANT

HALOGEN FREE

APPLICATIONS

- DC/DC converter
- Load switch



PRODUCT SUMMARY

	N-CHANNEL	P-CHANNEL
V_{DS} (V)	30	-30
$R_{DS(on)}$ (Ω) at V_{GS} = ± 10 V	0.388	1.070
$R_{DS(on)}$ (Ω) at V_{GS} = ± 4.5 V	0.525	2.590
Q_g typ. (nC)	0.55	0.8
I_D (A) [a]	0.7	-0.46
Configuration	Dual	

ORDERING INFORMATION

Package	SOT-363
Lead (Pb)-free and halogen-free	Si1539DDL-T1-GE3

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

PARAMETER		SYMBOL	N-CHANNEL	P-CHANNEL	UNIT
Drain-source voltage		V_{DS}	30	-30	V
Gate-source voltage		V_{GS}	± 20	± 20	
Continuous drain current (T_J = 150 °C)	T_C = 25 °C	I_D	0.7	-0.46	A
	T_C = 70 °C		0.6	-0.36	
	T_A = 25 °C		0.7 [b, c]	-0.42 [b, c]	
	T_A = 70 °C		0.5 [b, c]	-0.33 [b, c]	
Source-drain current diode current	T_C = 25 °C	I_S	0.3	-0.3	
	T_A = 25 °C		0.2 [b, c]	-0.2 [b, c]	
Pulsed drain current (t = 100 µs)		I_{DM}	2	-1	
Maximum power dissipation	T_C = 25 °C	P_D	0.34	0.34	W
	T_C = 70 °C		0.22	0.22	
	T_A = 25 °C		0.29 [b, c]	0.29 [b, c]	
	T_A = 70 °C		0.18 [b, c]	0.18 [b, c]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150		°C

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	N-CHANNEL		P-CHANNEL		UNIT
			TYP.	MAX.	TYP.	MAX.	
Maximum junction-to-ambient [b, d]	t ≤ 10 s	R_{thJA}	365	438	365	438	°C/W
Maximum junction-to-foot (drain)	Steady state	R_{thJF}	308	370	308	370	

Notes

a. Based on T_C = 25 °C
b. Surface mounted on 1" x 1" FR4 board
c. t = 10 s
d. Maximum under steady state conditions is 486 °C/W (N-Channel) and 486 °C/W (P-Channel)

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP. [a]**	**MAX.**	**UNIT**
Static							
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	N-Ch	30	-	-	V
		V_{GS} = 0 V, I_D = -250 µA	P-Ch	-30	-	-	
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA	N-Ch	-	30	-	mV/°C
		I_D = -250 µA	P-Ch	-	-25	-	
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$	I_D = 250 µA	N-Ch	-	-3.6	-	
		I_D = -250 µA	P-Ch	-	3.1	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	N-Ch	1.2	-	2.5	V
		V_{DS} = V_{GS}, I_D = -250 µA	P-Ch	-1.5	-	-3	
Gate-body leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	N-Ch	-	-	± 100	nA
			P-Ch	-	-	± 100	
Zero gate voltage drain current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V	N-Ch	-	-	1	µA
		V_{DS} = -30 V, V_{GS} = 0 V	P-Ch	-	-	-1	
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 55 °C	N-Ch	-	-	10	
		V_{DS} = -30 V, V_{GS} = 0 V, T_J = 55 °C	P-Ch	-	-	-10	
On-state drain current [b]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	N-Ch	2	-	-	A
		V_{DS} = -5 V, V_{GS} = -10 V	P-Ch	-1	-	-	
Drain-source on-state resistance [b]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 0.6 A	N-Ch	-	0.323	0.388	Ω
		V_{GS} = -10 V, I_D = -0.4 A	P-Ch	-	0.890	1.070	
		V_{GS} = 4.5 V, I_D = 0.1A	N-Ch	-	0.437	0.525	
		V_{GS} = -5 V, I_D = -0.1 A	P-Ch	-	1.850	2.590	
		V_{GS} = -4.35 V, I_D = -0.1 A		-	2.800	-	
Forward transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 0.6 A	N-Ch	-	1.2	-	S
		V_{DS} = -15 V, I_D = -0.4 A	P-Ch	-	0.6	-	
Dynamic [a]							
Input capacitance	C_{iss}	N-Channel V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz P-Channel V_{DS} = -15 V, V_{GS} = 0 V, f = 1 MHz	N-Ch	-	28	-	pF
			P-Ch	-	21	-	
Output capacitance	C_{oss}		N-Ch	-	10	-	
			P-Ch	-	10	-	
Reverse transfer capacitance	C_{rss}		N-Ch	-	5	-	
			P-Ch	-	6	-	
Total gate charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 0.6 A	N-Ch	-	1	1.5	nC
		V_{DS} = -15 V, V_{GS} = -10 V, I_D = -0.4 A	P-Ch	-	1.5	3	
		N-Channel V_{DS} = 15 V, V_{GS} = 4.5 V I_D = 0.6 A P-Channel V_{DS} = -15 V, V_{GS} = -4.5 V, I_D = -0.4 A	N-Ch	-	0.55	1.1	
			P-Ch	-	0.8	1.2	
Gate-source charge	Q_{gs}		N-Ch	-	0.2	-	
			P-Ch	-	0.4	-	
Gate-drain charge	Q_{gd}		N-Ch	-	0.2	-	
			P-Ch	-	0.35	-	
Gate resistance	R_g	f = 1 MHz	N-Ch	0.7	3.7	7.4	Ω
			P-Ch	0.3	15	30	

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP. [a]**	**MAX.**	**UNIT**
Dynamic [a]							
Turn-on delay time	$t_{d(on)}$	N-Channel V_{DD} = 15 V, R_L = 30 Ω, $I_D \cong$ 0.5 A, V_{GEN} = 10 V, R_g = 1 Ω P-Channel V_{DD} = -15 V, R_L = 38 Ω, $I_D \cong$ -0.4 A, V_{GEN} = -10 V, R_g = 1 Ω	N-Ch	-	2	4	ns
			P-Ch	-	4	8	
Rise time	t_r		N-Ch	-	14	21	
			P-Ch	-	18	30	
Turn-off delay time	$t_{d(off)}$		N-Ch	-	11	20	
			P-Ch	-	8	16	
Fall time	t_f		N-Ch	-	9	18	
			P-Ch	-	18	30	
Turn-on delay time	$t_{d(on)}$	N-Channel V_{DD} = 15 V, R_L = 30 Ω, $I_D \cong$ 0.5 A, V_{GEN} = 4.5 V, R_g = 1 Ω P-Channel V_{DD} = -15 V, R_L = 50 Ω, $I_D \cong$ -0.3 A, V_{GEN} = -4.5 V, R_g = 1 Ω	N-Ch	-	26	39	
			P-Ch	-	22	33	
Rise time	t_r		N-Ch	-	25	38	
			P-Ch	-	28	42	
Turn-off delay time	$t_{d(off)}$		N-Ch	-	14	21	
			P-Ch	-	4	8	
Fall Time	t_f		N-Ch	-	15	23	
			P-Ch	-	18	30	
Drain-Source Body Diode Characteristics							
Continuous source-drain diode current	I_S	T_C = 25 °C	N-Ch	-	-	0.3	A
			P-Ch	-	-	-0.3	
Pulse diode forward current (t = 100 µs)	I_{SM}		N-Ch	-	-	2	
			P-Ch	-	-	-1	
Body diode voltage	V_{SD}	I_S = 0.5 A	N-Ch	-	0.8	1.2	V
		I_S = -0.4 A	P-Ch	-	-0.8	-1.2	
Body diode reverse recovery time	t_{rr}	N-Channel I_F = 0.5 A, di/dt = 100 A/µs, T_J = 25 °C P-Channel I_F = -0.5 A, di/dt = -100 A/µs, T_J = 25 °C	N-Ch	-	10	20	ns
			P-Ch	-	13	20	
Body diode reverse recovery charge	Q_{rr}		N-Ch	-	3	6	nC
			P-Ch	-	8	16	
Reverse recovery fall time	t_a		N-Ch	-	6	-	ns
			P-Ch	-	7	-	
Reverse recovery rise time	t_b		N-Ch	-	4	-	
			P-Ch	-	6	-	

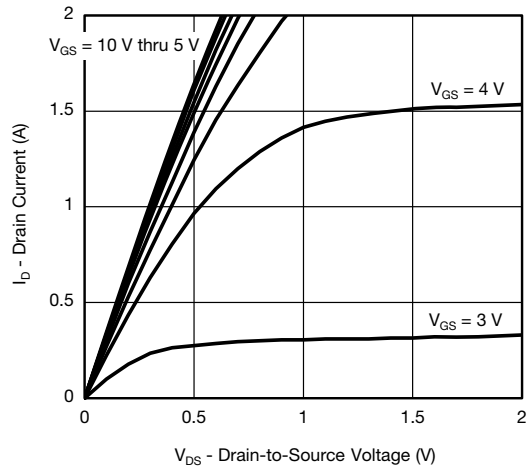
Notes

a. Guaranteed by design, not subject to production testing

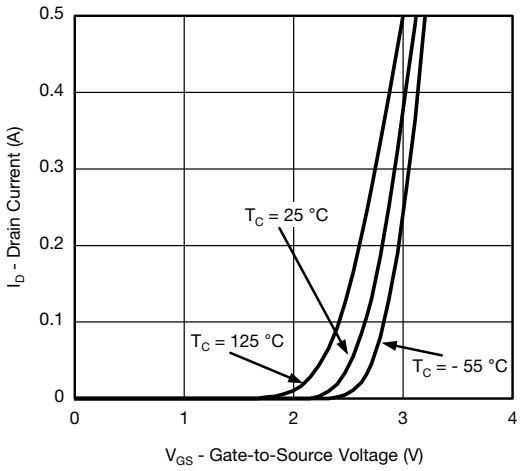
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

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.

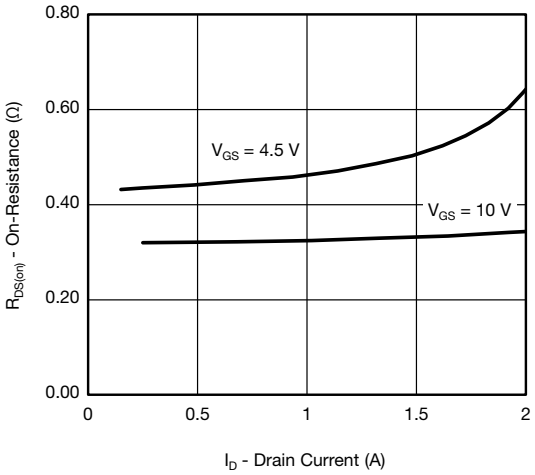
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



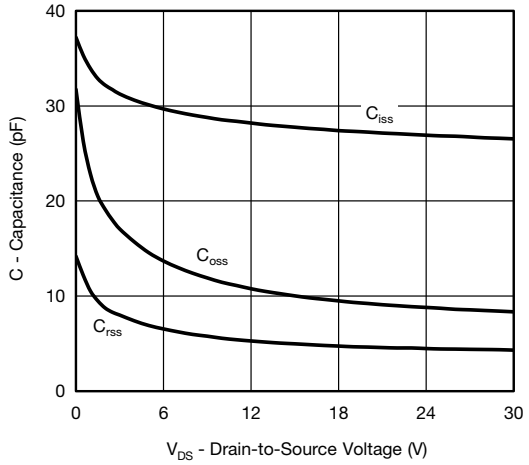
Output Characteristics



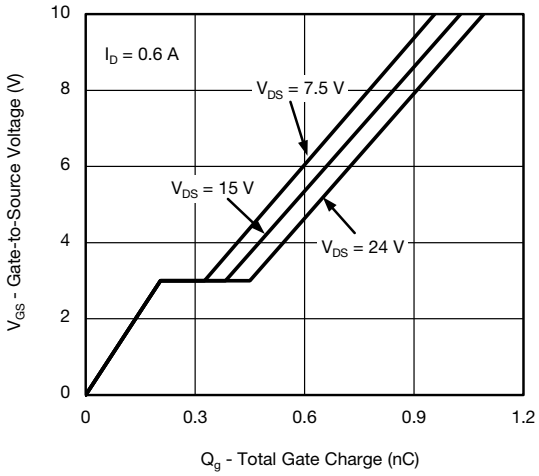
Transfer Characteristics



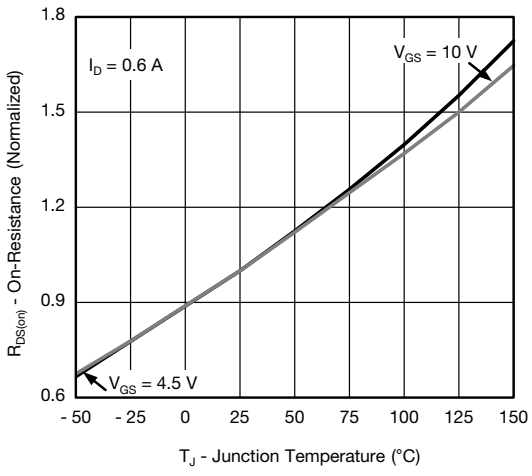
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

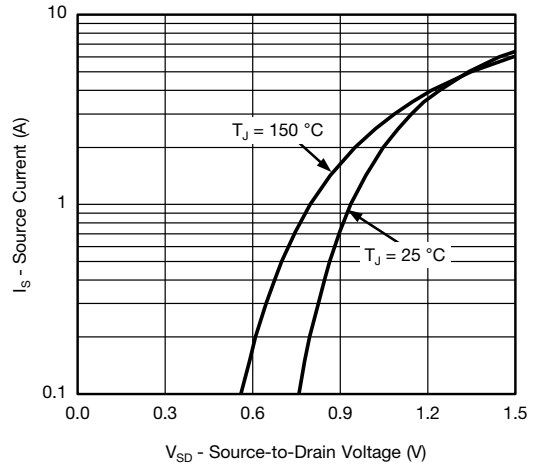


Gate Charge

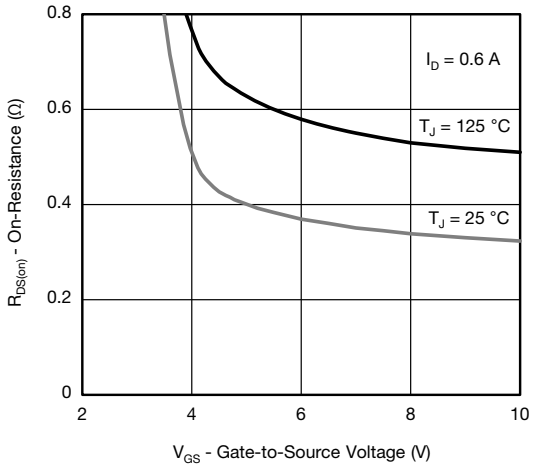


On-Resistance vs. Junction Temperature

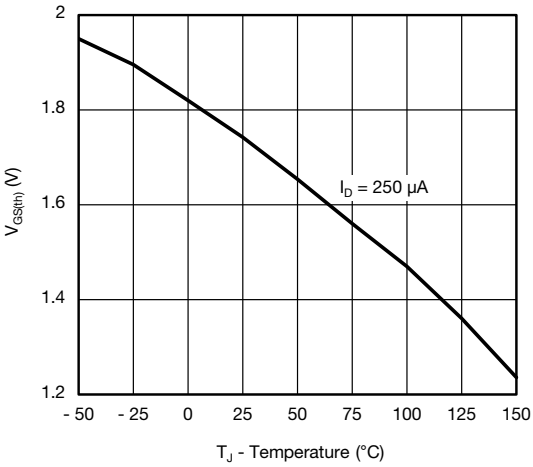
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



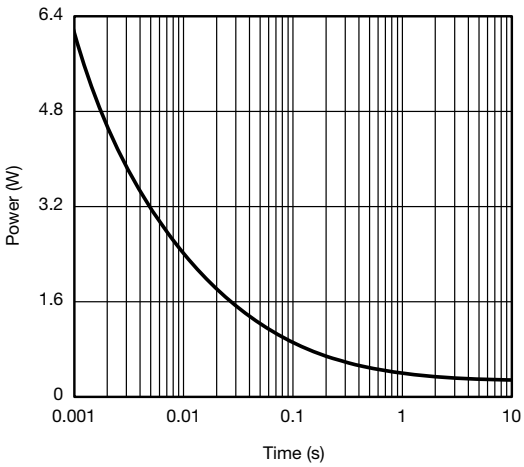
Source-Drain Diode Forward Voltage



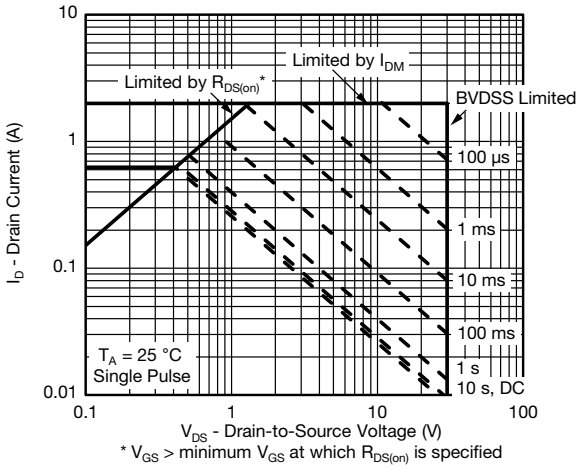
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

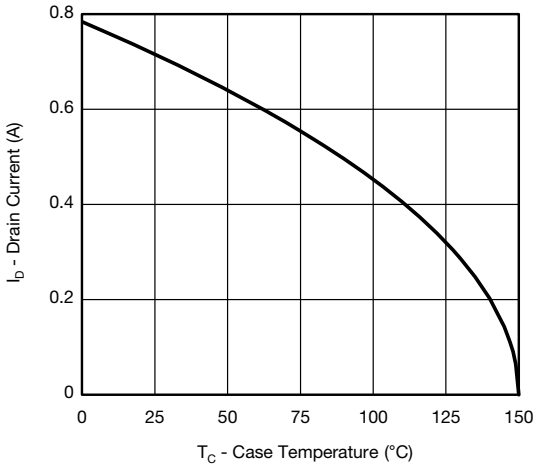


Single Pulse Power, Junction-to-Ambient

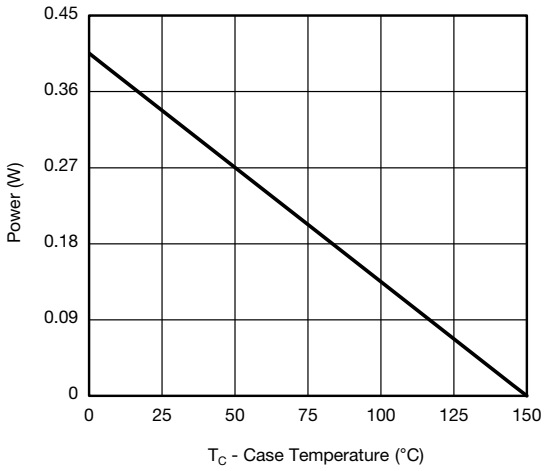


Safe Operating Area, Junction-to-Ambient

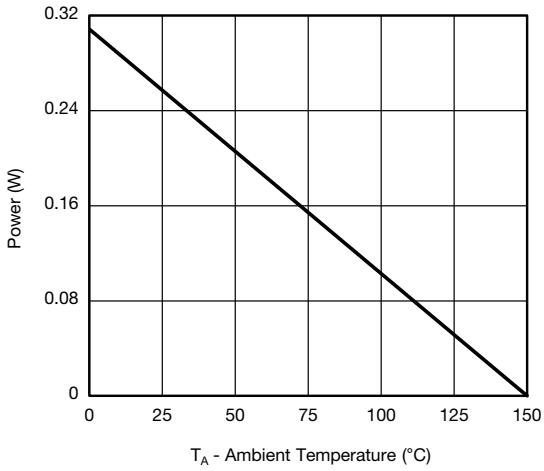
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating [a]



Power Derating, Junction-to-Foot

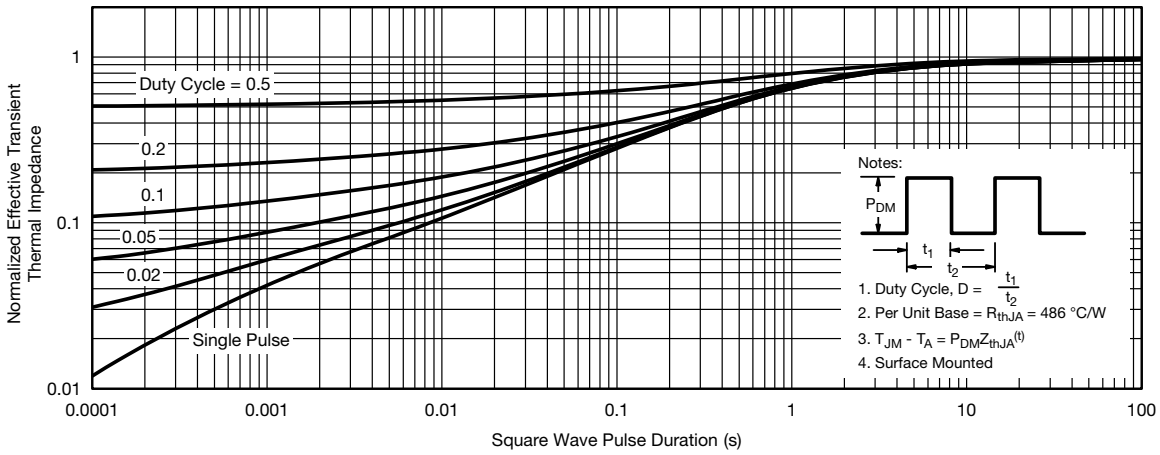


Power Derating, Junction-to-Ambient

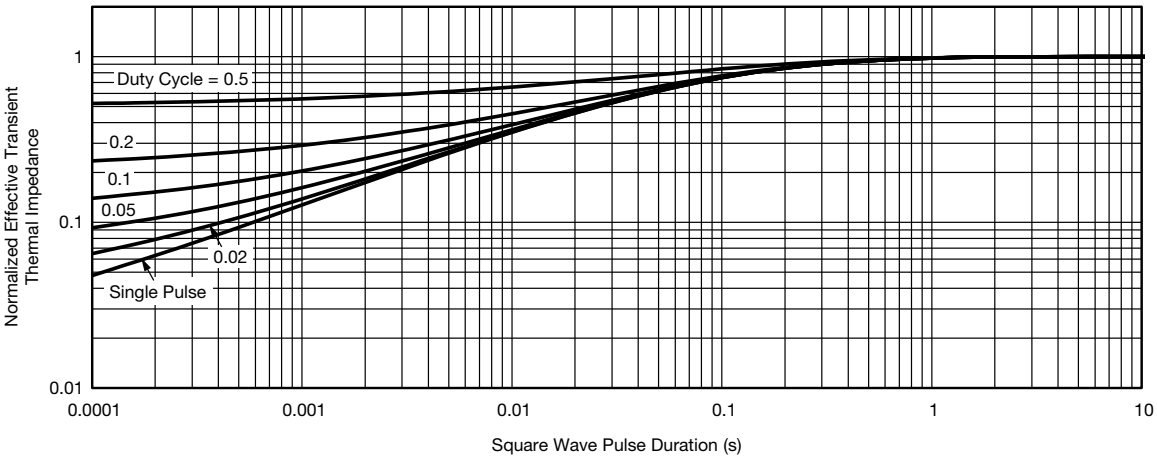
Note

a. The power dissipation P_D is based on T_J max. = 150 °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

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

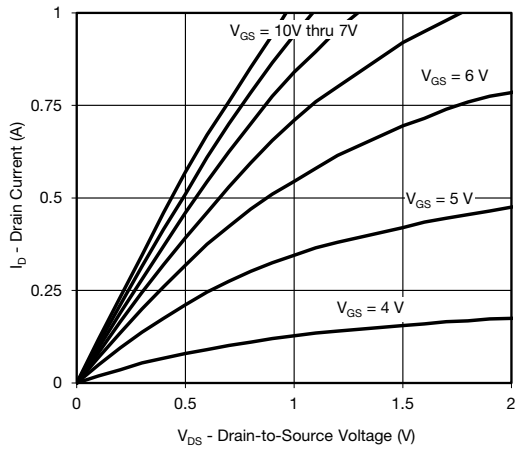


Normalized Thermal Transient Impedance, Junction-to-Ambient

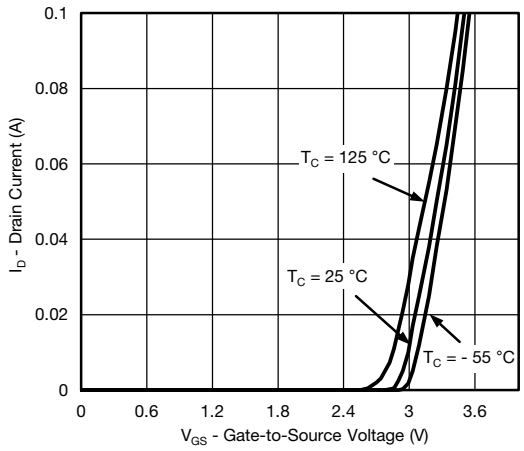


Normalized Thermal Transient Impedance, Junction-to-Foot

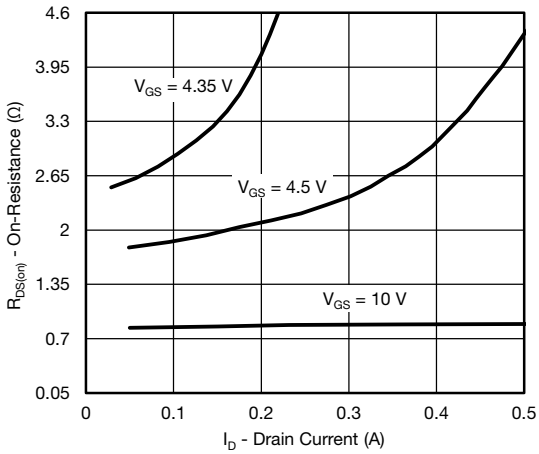
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



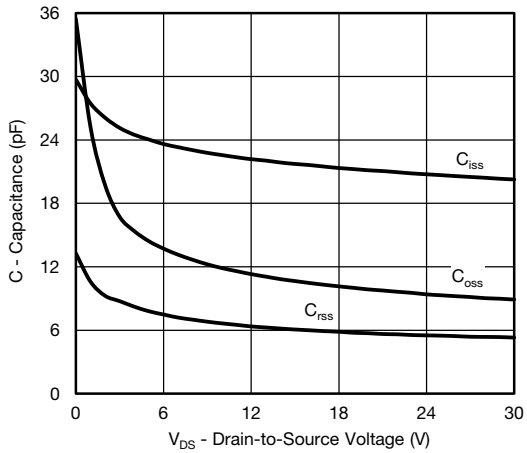
Output Characteristics



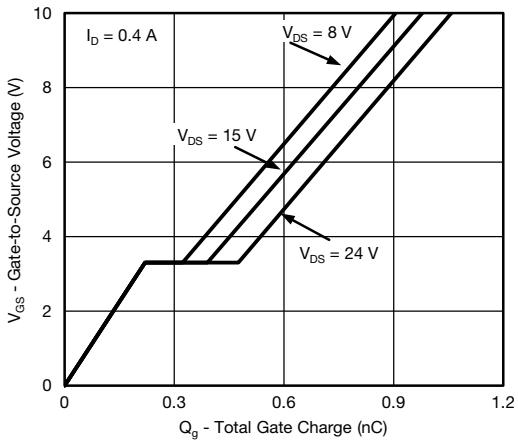
Transfer Characteristics



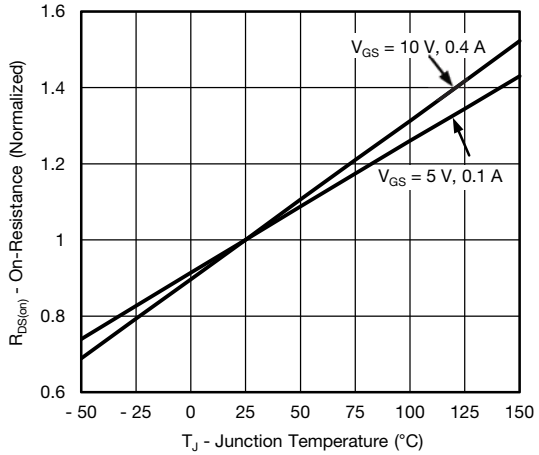
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

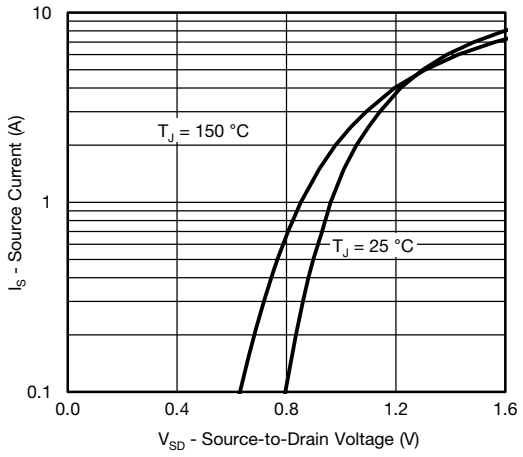


Gate Charge

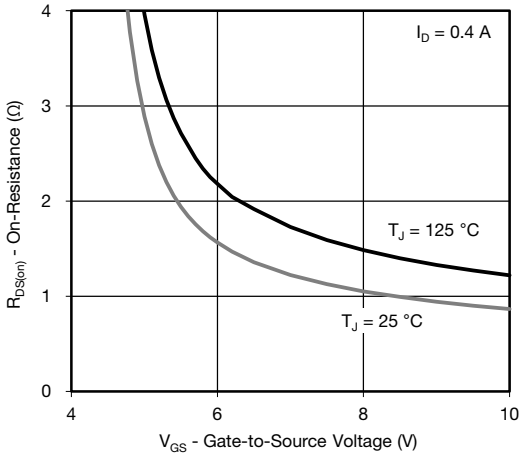


On-Resistance vs. Junction Temperature

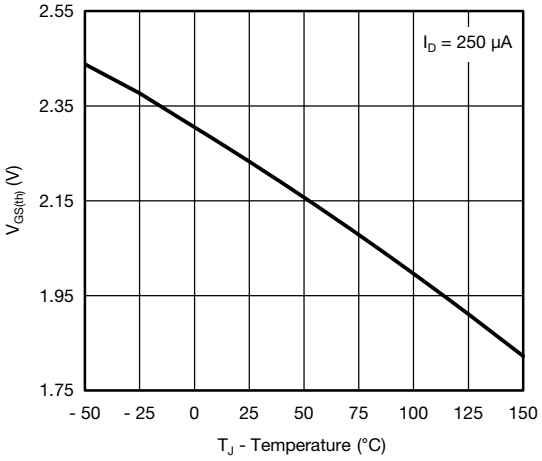
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



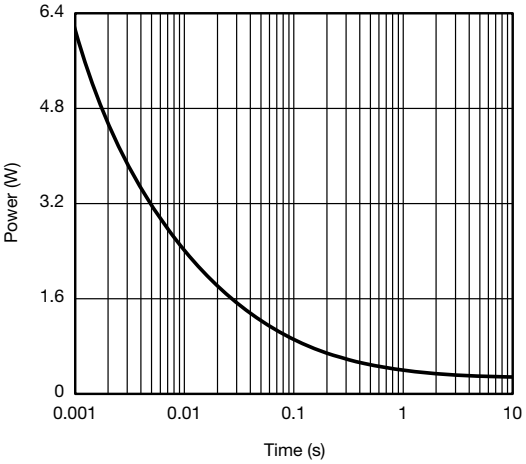
Source-Drain Diode Forward Voltage



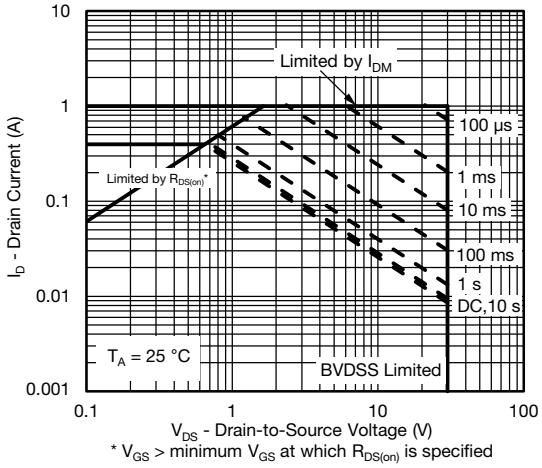
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

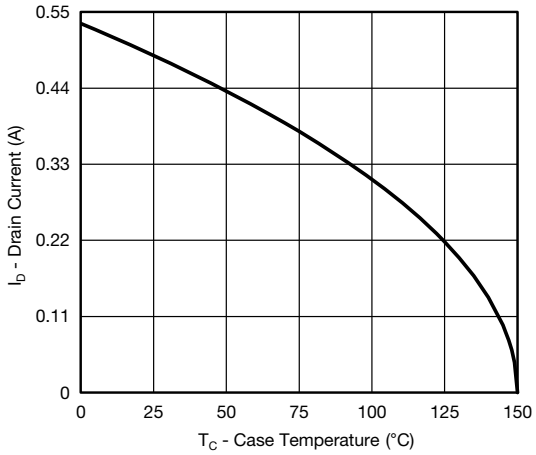


Single Pulse Power, Junction-to-Ambient

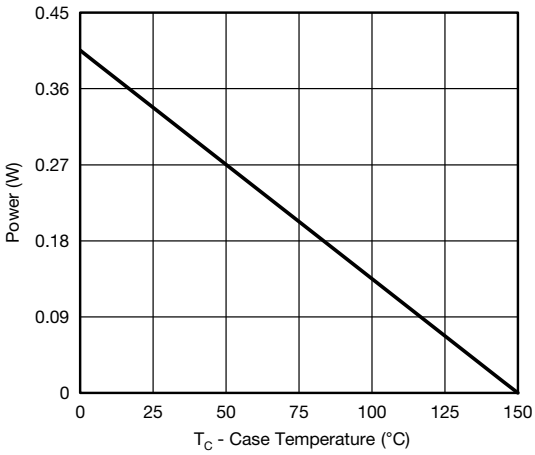


Safe Operating Area, Junction-to-Ambient

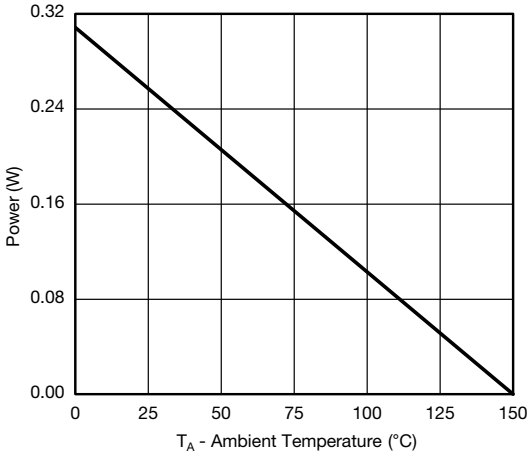
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating [a]



Power Derating, Junction-to-Foot

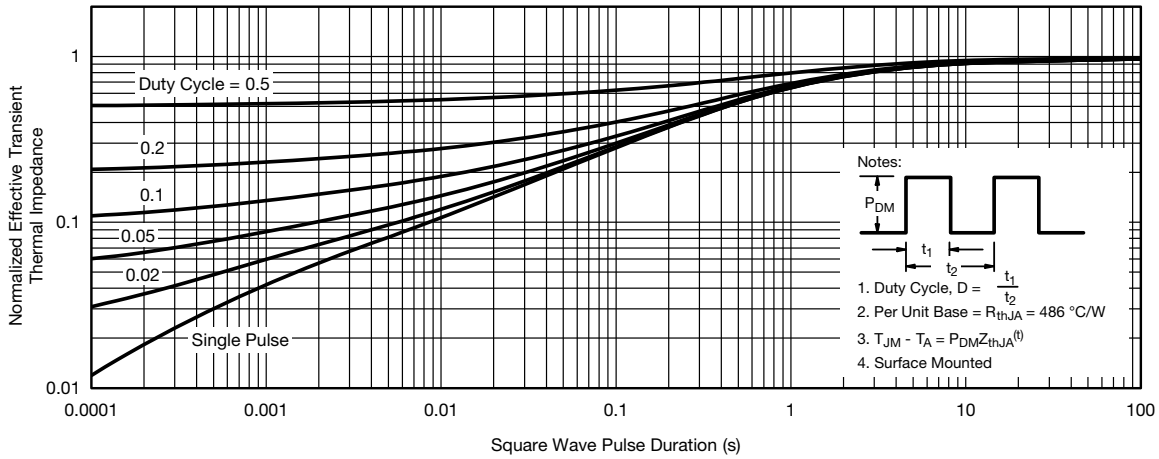


Power Derating, Junction-to-Ambient

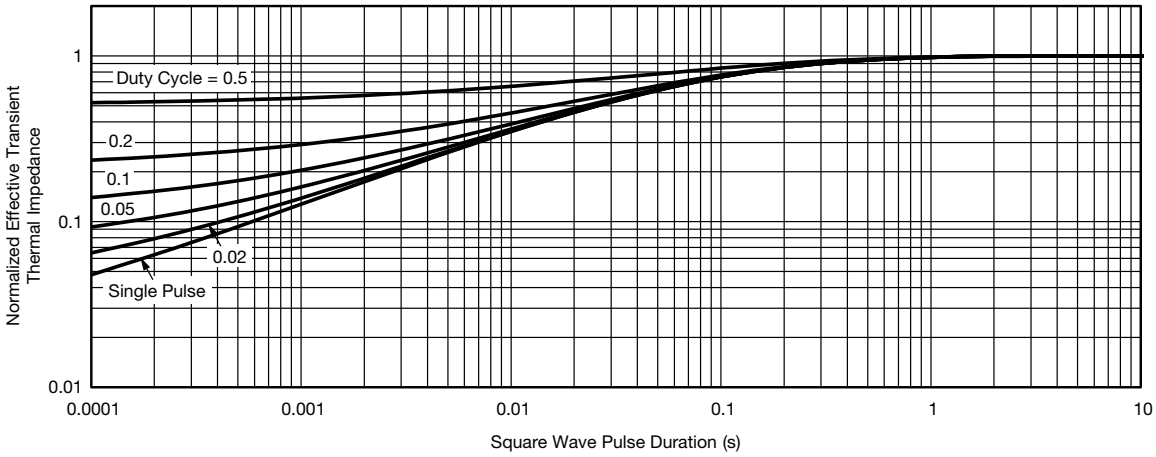
Note

a. The power dissipation P_D is based on T_J max. = 150 °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

P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise 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 www.vishay.com/ppg?62999.

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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 in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

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

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET ***category:***

Click to view products by Vishay ***manufacturer:***

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 2N7000 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C IPS70R2K0CEAKMA1 BUK954R8-60E DMN3404LQ-7 NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI DMN1017UCP3-7 EFC2J004NUZTDG ECH8691-TL-W FCAB21350L1 P85W28HP2F-7071 DMN1053UCP4-7 NTE221 NTE2384 NTE2903 NTE2941 NTE2945 NTE2946 NTE2960 NTE2967 NTE2969 NTE2976 NTE455 NTE6400A NTE2910 NTE2916 NTE2956 NTE2911 TK10A80W,S4X(S SSM6P69NU,LF DMP22D4UFO-7B