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

PRODUCT SUMMARY

	V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
N-Channel	30	0.055 at V_{GS} = 4.5 V	$4^{a,g}$	4.2 nC
		0.090 at V_{GS} = 2.5 V	$4^{a,g}$	
P-Channel	- 30	0.150 at V_{GS} = - 4.5 V	$- 3.6^{a}$	2.85 nC
		0.256 at V_{GS} = - 2.5 V	$- 2.7^{a}$	

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFETs
- Compliant to RoHS Directive 2002/95/EC

Pb-free

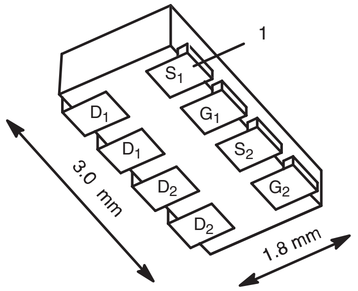
RoHS
COMPLIANT

HALOGEN
FREE
Available

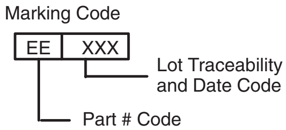
APPLICATIONS

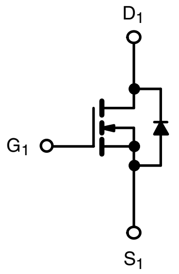
- Buck-Boost
  - DSC
  - Portable Devices

1206-8 ChipFET®

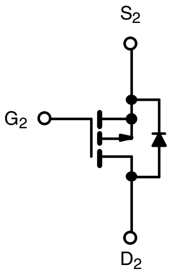


Bottom View





N-Channel MOSFET



P-Channel MOSFET

Ordering Information: Si5511DC-T1-E3 (Lead (Pb)-free)
Si5511DC-T1-GE3 (Lead (Pb)-free and Halogen-free)

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}	± 12		
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	$4^{a, g}$	$- 3.6^{a}$	A
	T_C = 70 °C		$4^{a, g}$	$- 2.8^{a}$	
	T_A = 25 °C		$4^{a, g}$	$- 2.3^{b, c}$	
	T_A = 70 °C		3.9^{a}	$- 1.8^{b, c}$	
Pulsed Drain Current		I_{DM}	15	- 10	
Source Drain Current Diode Current	T_C = 25 °C	I_S	2.6	- 2.6	
	T_A = 25 °C		$1.7^{b, c}$	$- 1.7^{b, c}$	
Maximum Power Dissipation	T_C = 25 °C	P_D	3.1	2.6	W
	T_C = 70 °C		2.0	1.7	
	T_A = 25 °C		$2.1^{b, c}$	$1.3^{b, c}$	
	T_A = 70 °C		$1.33^{b, c}$	$0.84^{b, c}$	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature)[d, e]			260		

THERMAL RESISTANCE RATINGS

			N-Channel		P-Channel		
Parameter		Symbol	Typ.	Max.	Typ.	Max.	Unit
Maximum Junction-to-Ambient[b, f]	t ≤ 5 s	R_{thJA}	50	60	77	95	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	30	40	33	40	

Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. See Reliability Manual for profile. The ChipFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequade bottom side solder interconnection.
e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
f. Maximum under steady state conditions is 110 °C/W for N-Channel and 130 °C/W for P-Channel.
g. Package limited.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted

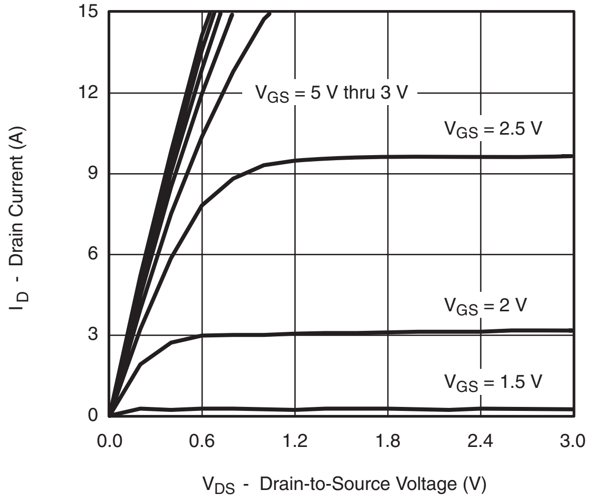
Parameter	Symbol	Test Conditions		Min.	Typ.[a]	Max.	Unit
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	N-Ch	30			V
		V_{GS} = 0 V, I_D = - 250 µA	P-Ch	- 30			
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA	N-Ch		24.2		mV/°C
		I_D = - 250 µA	P-Ch		- 23.1		
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I_D = 250 µA	N-Ch		3.6		
		I_D = - 250 µA	P-Ch		2.3		
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	N-Ch	0.7		2	V
		V_{DS} = V_{GS}, I_D = - 250 µA	P-Ch	- 0.7		- 2	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 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} = 4.5 V	N-Ch	15			A
		V_{DS} ≤ - 5 V, V_{GS} = - 4.5 V	P-Ch	- 10			
Drain-Source On-State Resistance[b]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 4.8 A	N-Ch		0.045	0.055	Ω
		V_{GS} = - 4.5 V, I_D = - 2.3 A	P-Ch		0.125	0.150	
		V_{GS} = 2.5 V, I_D = 3.8 A	N-Ch		0.075	0.090	
		V_{GS} = - 2.5 V, I_D = 1.8 A	P-Ch		0.213	0.256	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 4.8 A	N-Ch		10.8		S
		V_{DS} = - 15 V, I_D = - 2.3 A	P-Ch		6.56		
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		435		pF
			P-Ch		260		
Output Capacitance	C_{oss}		N-Ch		65		
			P-Ch		55		
Reverse Transfer Capacitance	C_{rss}		N-Ch		30		
			P-Ch		42		
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 5 V, I_D = 4.8 A	N-Ch		4.7	7.1	nC
		V_{DS} = - 15 V, V_{GS} = - 5 V, I_D = - 3.2 A	P-Ch		4.1	6.2	
		N-Channel V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 4.8 A P-Channel V_{DS} = - 15 V, V_{GS} = - 4.5 V, I_D = - 3.2 A	N-Ch		4.2	6.3	
			P-Ch		3.8	4.6	
Gate-Source Charge	Q_{gs}		N-Ch		1.1		
			P-Ch		0.6		
Gate-Drain Charge	Q_{gd}		N-Ch		0.9		
			P-Ch		1.85		
Gate Resistance	R_g	f = 1 MHz	N-Ch		2.7		Ω
			P-Ch		7.7		

SPECIFICATIONS T_J = 25 °C, unless otherwise noted

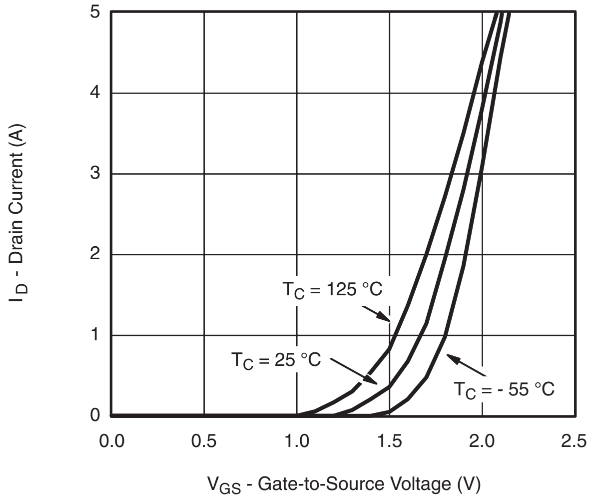
Parameter	Symbol	Test Conditions		Min.	Typ.[a]	Max.	Unit
Dynamic[a]							
Turn-On Delay Time	$t_{d(on)}$	N-Channel V_{DD} = 15 V, R_L = 3.95 Ω $I_D \cong$ 3.8 A, V_{GEN} = 4.5 V, R_g = 1 Ω P-Channel V_{DD} = - 15 V, R_L = 18.1 Ω $I_D \cong$ - 1.86 A, V_{GEN} = - 4.5 V, R_g = 1 Ω	N-Ch		9	12	ns
			P-Ch		15	23	
Rise Time	t_r		N-Ch		45	68	
			P-Ch		78	117	
Turn-Off Delay Time	$t_{d(off)}$		N-Ch		48	72	
			P-Ch		33	50	
Fall Time	t_f		N-Ch		28	42	
			P-Ch		65	98	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C	N-Ch			2.6	A
			P-Ch			- 2.6	
Pulse Diode Forward Current[a]	I_{SM}		N-Ch			15	
			P-Ch			- 10	
Body Diode Voltage	V_{SD}	I_S = 2.4 A, V_{GS} = 0 V	N-Ch		0.8	1.2	V
		I_S = - 1.5 A, V_{GS} = 0 V	P-Ch		- 0.8	- 1.2	
Body Diode Reverse Recovery Time	t_{rr}	N-Channel I_F = 2.4 A, dI/dt = 100 A/µs, T_J = 25 °C P-Channel I_F = - 1.5 A, dI/dt = - 100 A/µs, T_J = 25 °C	N-Ch		11.6	18	ns
			P-Ch		19.8	30	
Body Diode Reverse Recovery Charge	Q_{rr}		N-Ch		6.1	9.2	nC
			P-Ch		17.5	27	
Reverse Recovery Fall Time	t_a		N-Ch		8.4		ns
			P-Ch		17.2		
Reverse Recovery Rise Time	t_b		N-Ch		3.2		
			P-Ch		2.6		

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

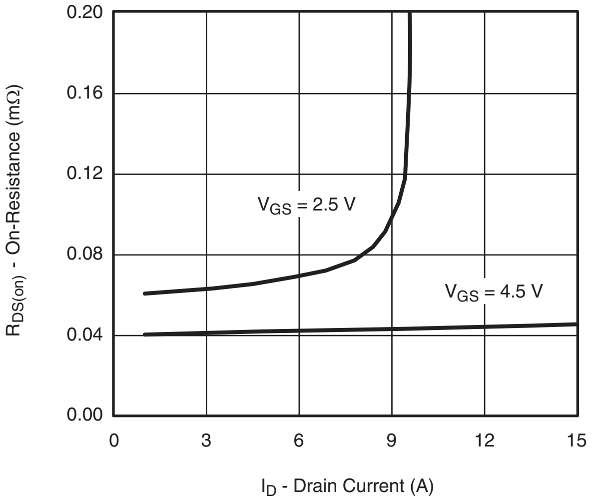
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



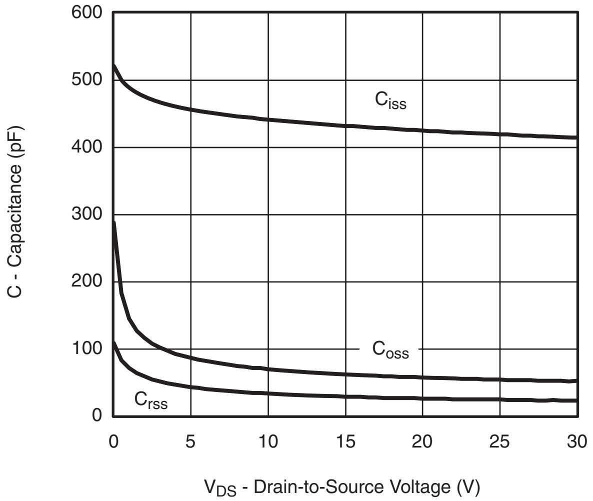
Output Characteristics



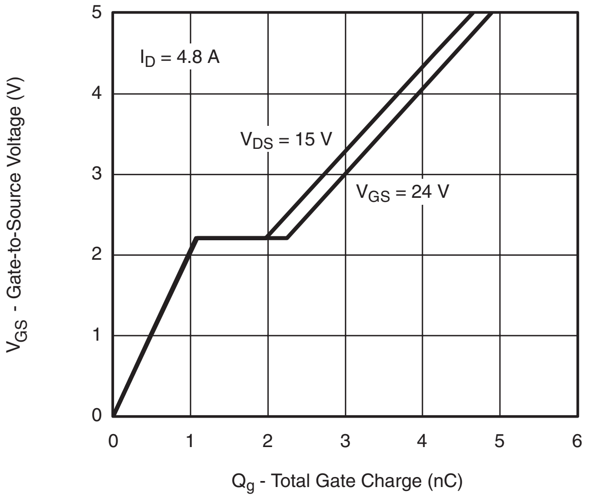
Transfer Characteristics



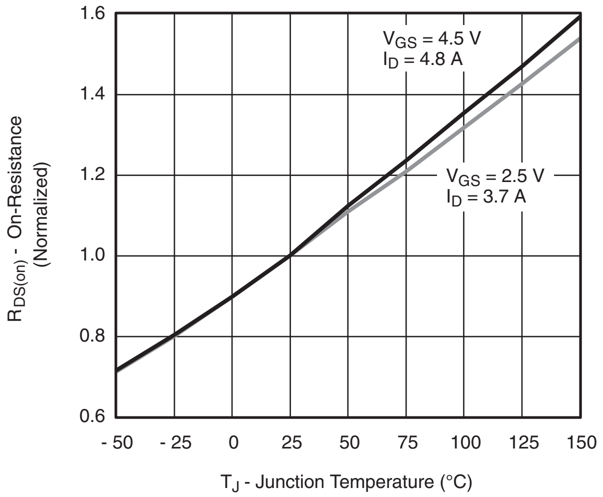
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

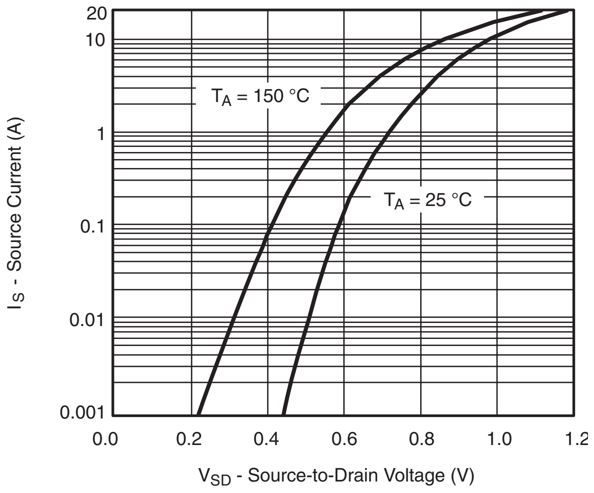


Gate Charge

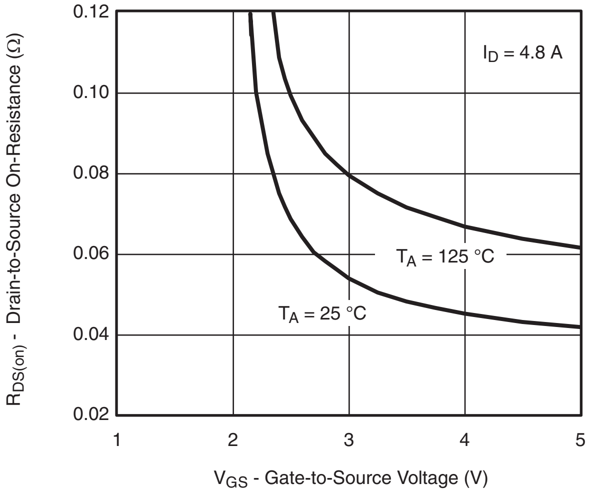


On-Resistance vs. Junction Temperature

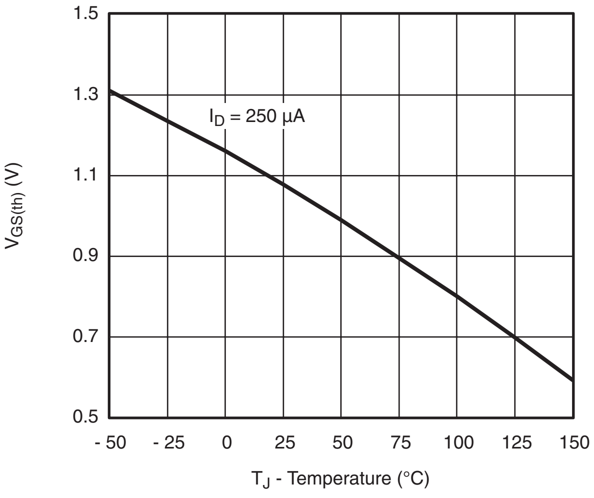
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



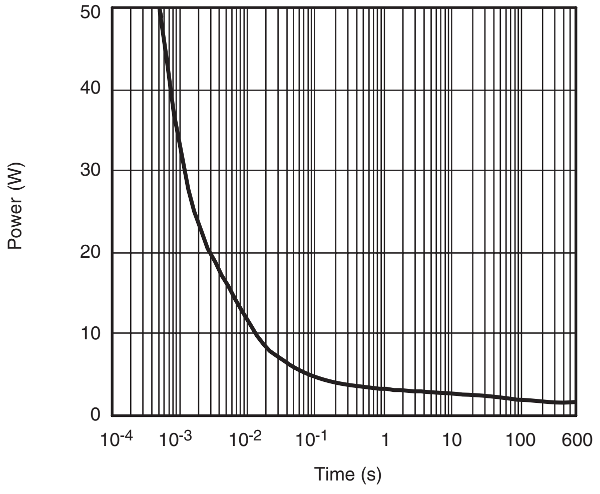
Source-Drain Diode Forward Voltage



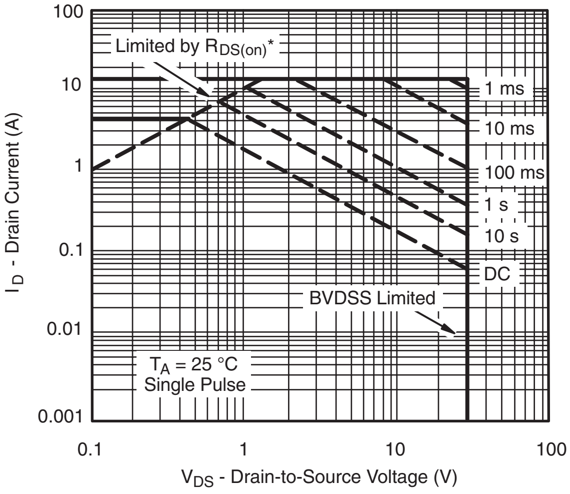
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



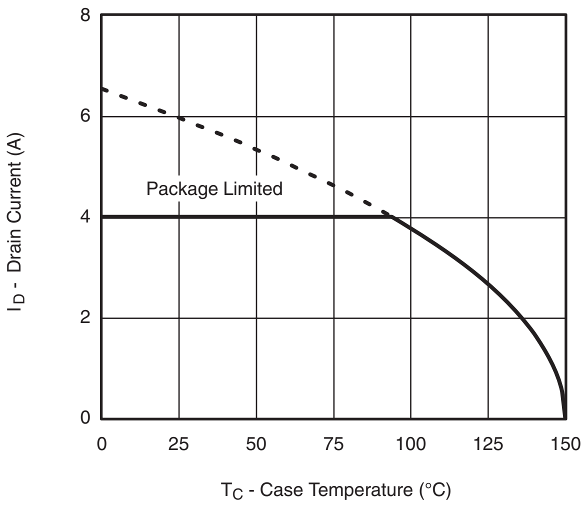
Single Pulse Power



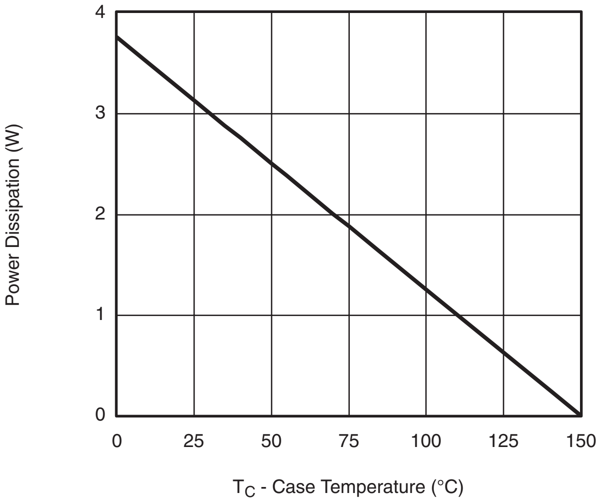
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

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



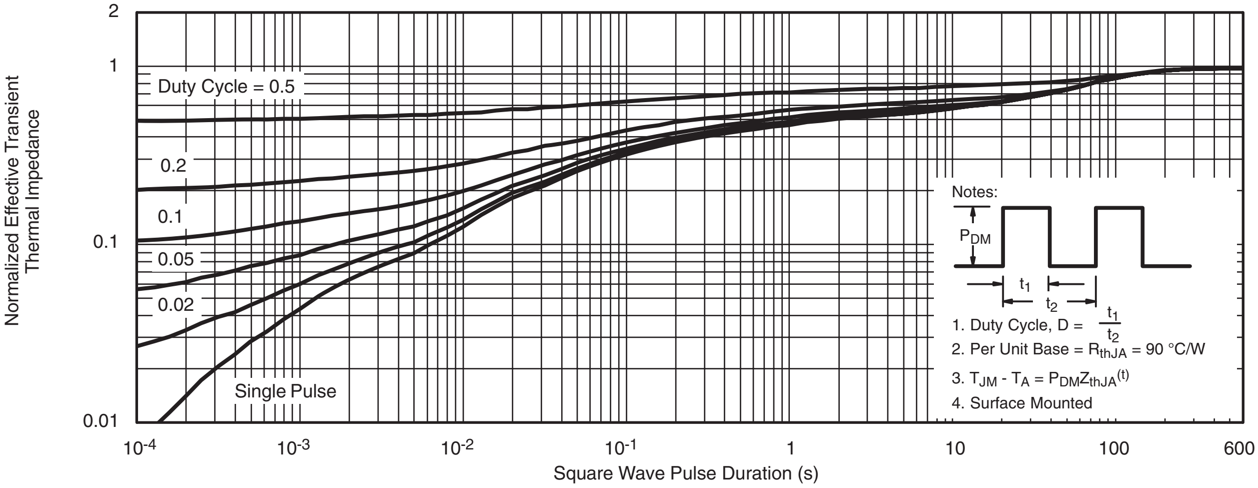
Current Derating*



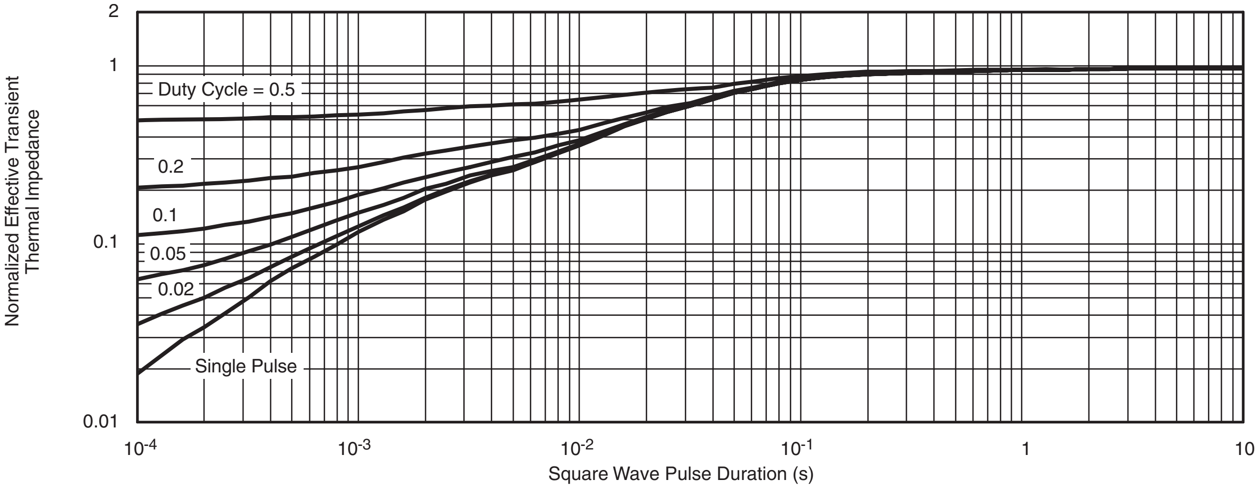
Power Derating

* 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

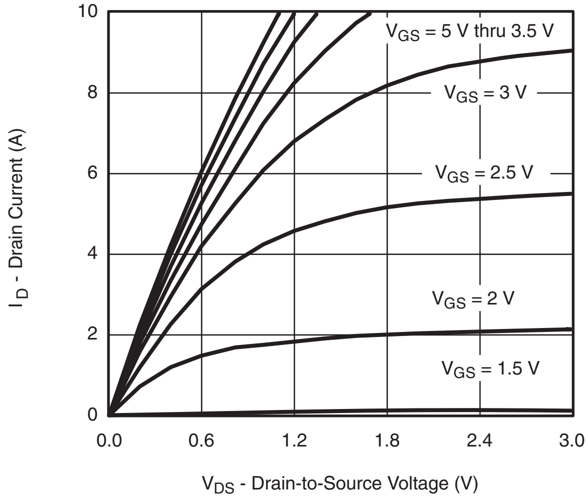


Normalized Thermal Transient Impedance, Junction-to-Ambient

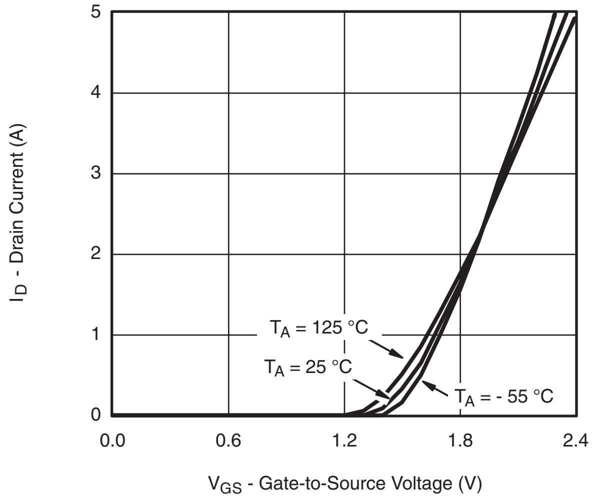


Normalized Thermal Transient Impedance, Junction-to-Foot

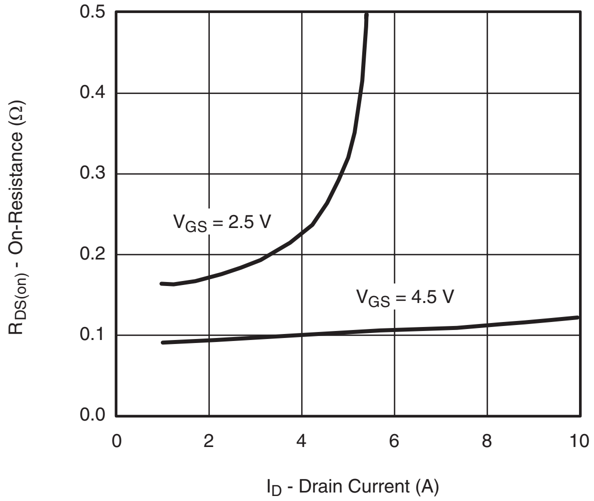
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



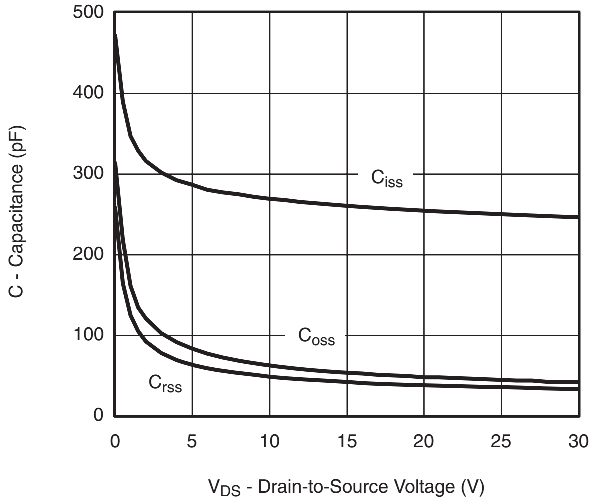
Output Characteristics



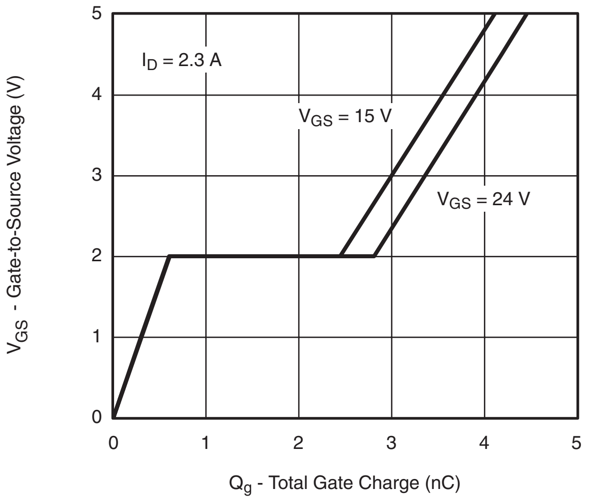
Transfer Characteristics



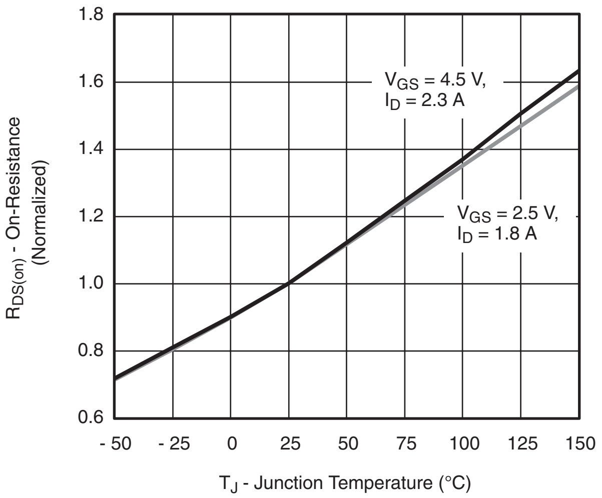
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

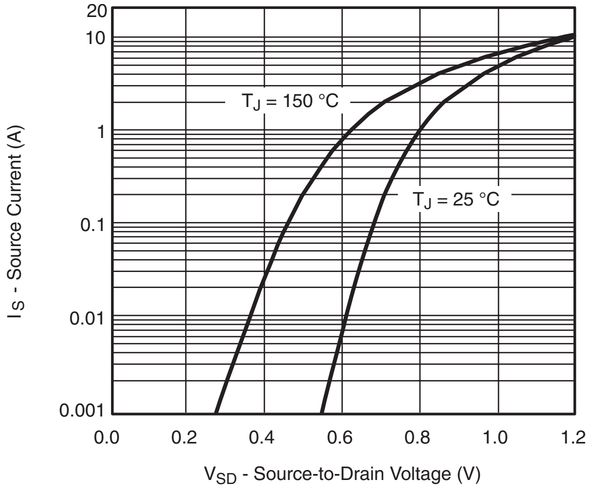


Gate Charge

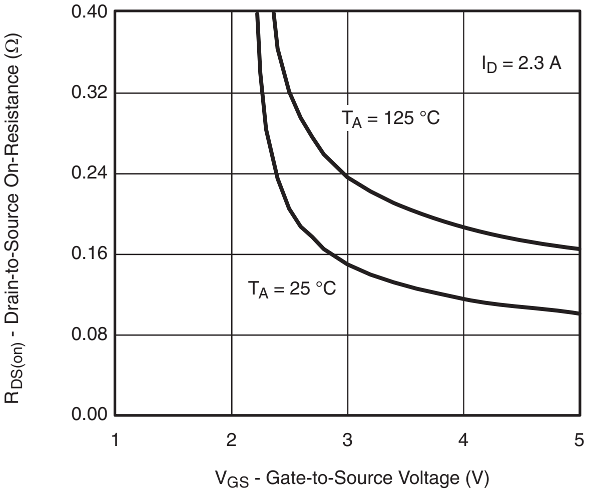


On-Resistance vs. Junction Temperature

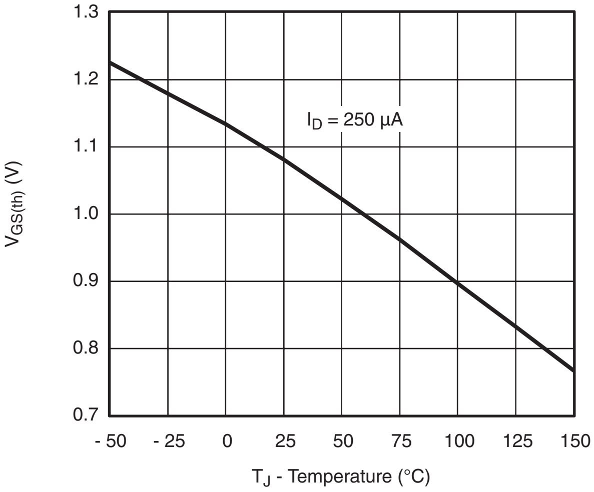
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



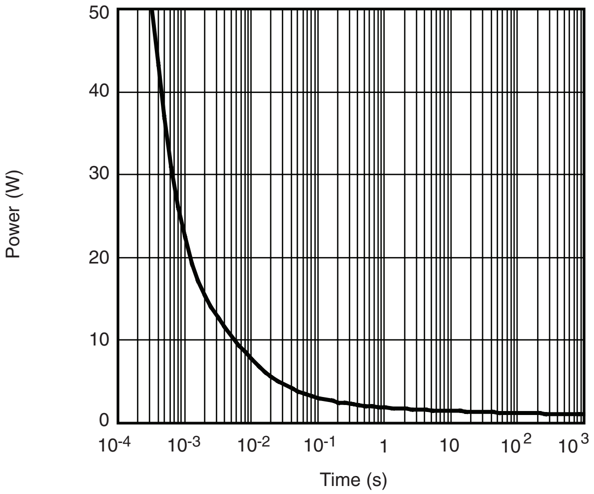
Source-Drain Diode Forward Voltage



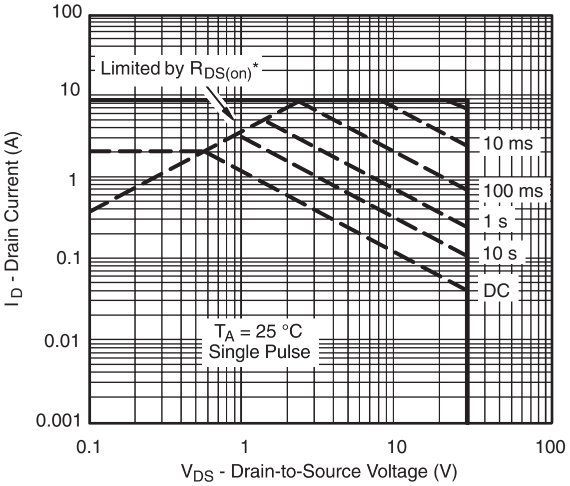
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



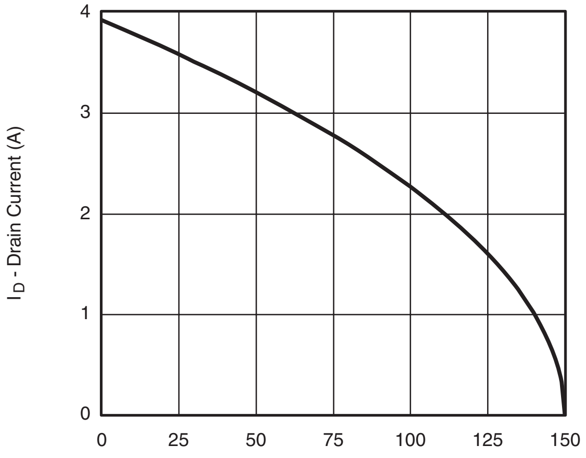
Single Pulse Power



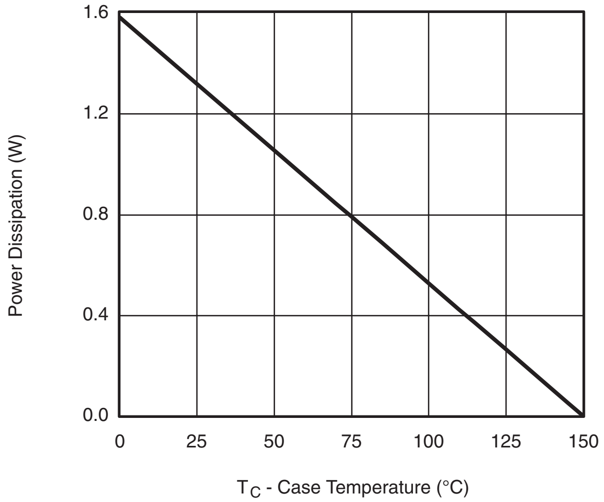
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case

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



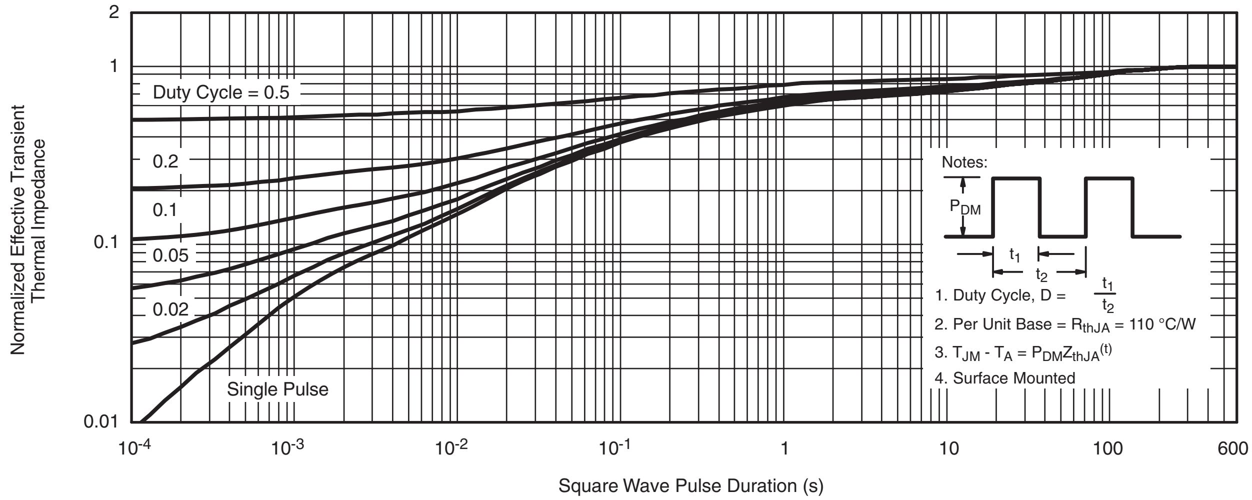
Current Derating*



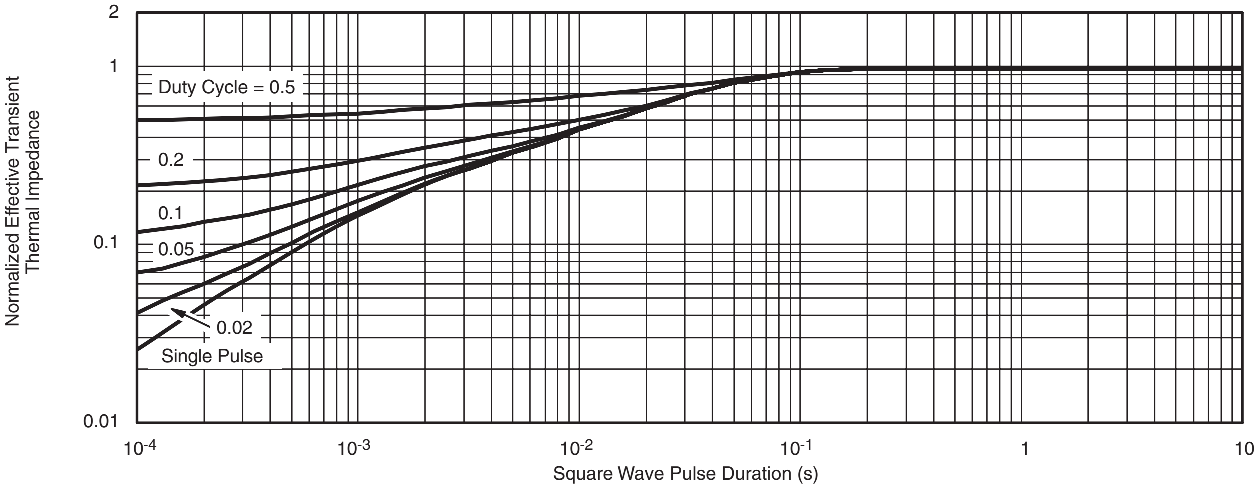
Power Derating

* 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

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Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.