

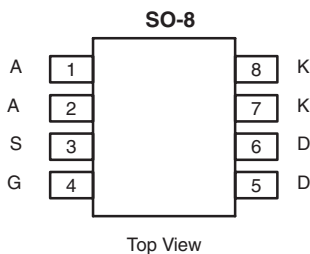
P-Channel 20-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
- 20	0.215 at $V_{GS} = - 4.5$ V	- 2	2.6 nC
	0.320 at $V_{GS} = - 2.5$ V	- 2	

SCHOTTKY PRODUCT SUMMARY

V_{KA} (V)	V_f (V) Diode Forward Voltage	I_F (A) ^a
30	0.44 at 1 A	2



FEATURES

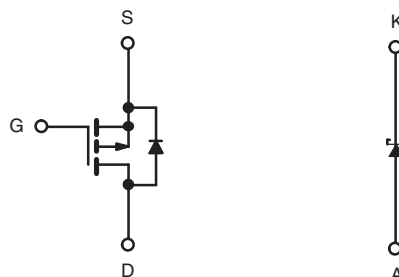
- Halogen-free According to IEC 61249-2-21 Definition
- LITTLE FOOT® Plus Schottky
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Load Switch for Portable Devices
- DC/DC Buck Converter



P-Channel MOSFET

Ordering Information: Si4829DY-T1-E3 (Lead (Pb)-free)
Si4829DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter		Symbol	Limit	Unit
Drain-Source Voltage (MOSFET)		V_{DS}	- 20	V
Reverse Voltage (Schottky)		V_{KA}	30	
Gate-Source Voltage (MOSFET)		V_{GS}	± 12	
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$) (MOSFET)	$T_C = 25\text{ }^{\circ}\text{C}$	I_D	- 2^a	A
	$T_C = 70\text{ }^{\circ}\text{C}$		- 2^a	
	$T_A = 25\text{ }^{\circ}\text{C}$		- $2^a, b, c$	
	$T_A = 70\text{ }^{\circ}\text{C}$		- $2^a, b, c$	
Pulsed Drain Current (MOSFET)		I_{DM}	- 7	
Continuous Source-Drain Diode Current (MOSFET Diode Conduction)	$T_C = 25\text{ }^{\circ}\text{C}$	I_S	- 2.2	
	$T_A = 25\text{ }^{\circ}\text{C}$		- 1.4 ^{b, c}	
Average Forward Current (Schottky)		I_F	2 ^b	
Maximum Power Dissipation (MOSFET)	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	3.1	W
	$T_C = 70\text{ }^{\circ}\text{C}$		2	
	$T_A = 25\text{ }^{\circ}\text{C}$		2 ^{b, c}	
	$T_A = 70\text{ }^{\circ}\text{C}$		1.3 ^{b, c}	
Maximum Power Dissipation (Schottky)	$T_C = 25\text{ }^{\circ}\text{C}$		2.3	
	$T_C = 70\text{ }^{\circ}\text{C}$		1.5	
	$T_A = 25\text{ }^{\circ}\text{C}$		1.7 ^{b, c}	
	$T_A = 70\text{ }^{\circ}\text{C}$		1.1 ^{b, c}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (MOSFET) ^{b, f}	R_{thJA}	55	62.5	°C/W
Maximum Junction-to-Foot (Drain) (MOSFET)	R_{thJF}	30	40	
Maximum Junction-to-Ambient (Schottky) ^{b, g}	R_{thJA}	57	75	
Maximum Junction-to-Foot (Drain) (Schottky)	R_{thJF}	42	55	

Notes:

a. Package limited.

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

c. $t = 10$ s.

f. Maximum under Steady State conditions is 110 °C/W.

g. Maximum under Steady State conditions is 110 °C/W.

SPECIFICATIONS $T_J = 25$ °C, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0$ V, $I_D = -250$ μ A	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250$ μ A		- 19		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250$ μ A	- 0.6		- 1.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 12$ V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20$ V, $V_{GS} = 0$ V			- 1	μ A
		$V_{DS} = -20$ V, $V_{GS} = 0$ V, $T_J = 55$ °C			- 10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5$ V, $V_{GS} = -10$ V	- 7			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5$ V, $I_D = -2.5$ A		0.175	0.215	Ω
		$V_{GS} = -2.5$ V, $I_D = -1.0$ A		0.260	0.320	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10$ V, $I_D = -2.5$ A		5		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -10$ V, $V_{GS} = 0$ V, $f = 1$ MHz		210		pF
Output Capacitance	C_{oss}			55		
Reverse Transfer Capacitance	C_{rss}			40		
Total Gate Charge	Q_g	$V_{DS} = -10$ V, $V_{GS} = -10$ V, $I_D = -2.5$ A		5.2	8	nC
		$V_{DS} = -10$ V, $V_{GS} = -4.5$ V, $I_D = -2.5$ A		2.6	4	
Gate-Source Charge	Q_{gs}			0.53		
Gate-Drain Charge	Q_{gd}			0.9		
Gate Resistance	R_g	$f = 1$ MHz		7	14	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10$ V, $R_L = 5$ Ω $I_D \cong -2$ A, $V_{GEN} = -4.5$ V, $R_g = 1$ Ω		20	30	ns
Rise Time	t_r			45	70	
Turn-Off Delay Time	$t_{d(off)}$			15	25	
Fall Time	t_f			10	15	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10$ V, $R_L = 5$ Ω $I_D \cong -2$ A, $V_{GEN} = -10$ V, $R_g = 1$ Ω		5	10	
Rise Time	t_r			12	20	
Turn-Off Delay Time	$t_{d(off)}$			15	25	
Fall Time	t_f			10	15	



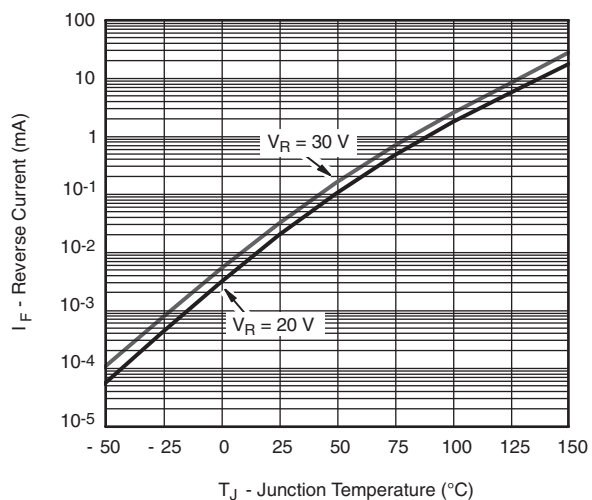
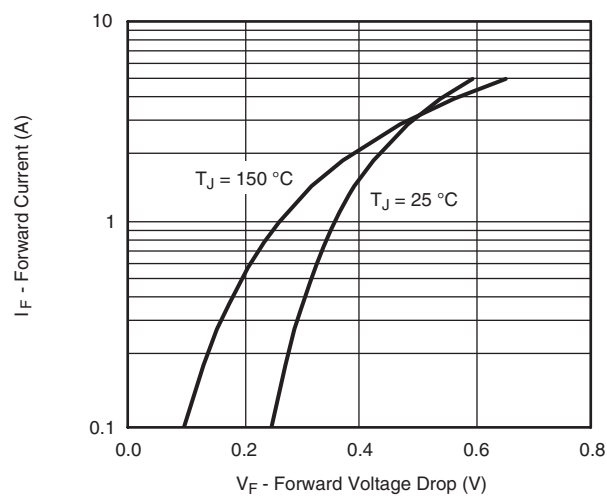
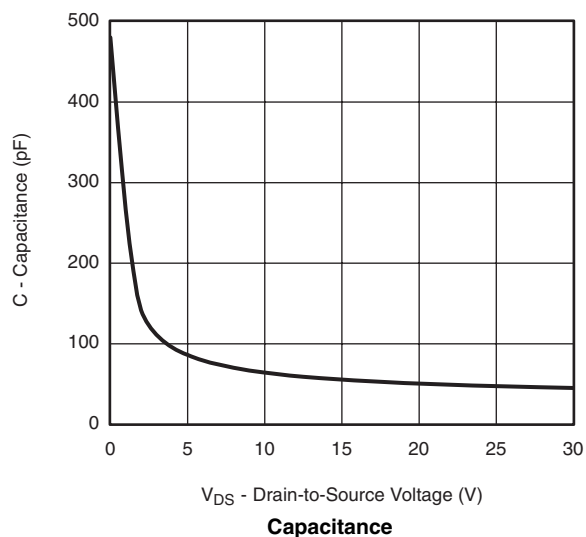
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			- 2	A
Pulse Diode Forward Current	I_{SM}				- 7	
Body Diode Voltage	V_{SD}	$I_S = - 2\text{ A}$, $V_{GS} = 0\text{ V}$		- 1	- 1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = - 2\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$		20	30	ns
Body Diode Reverse Recovery Charge	Q_{rr}			14	20	nC
Reverse Recovery Fall Time	t_a			14		ns
Reverse Recovery Rise Time	t_b			6		

Notes:

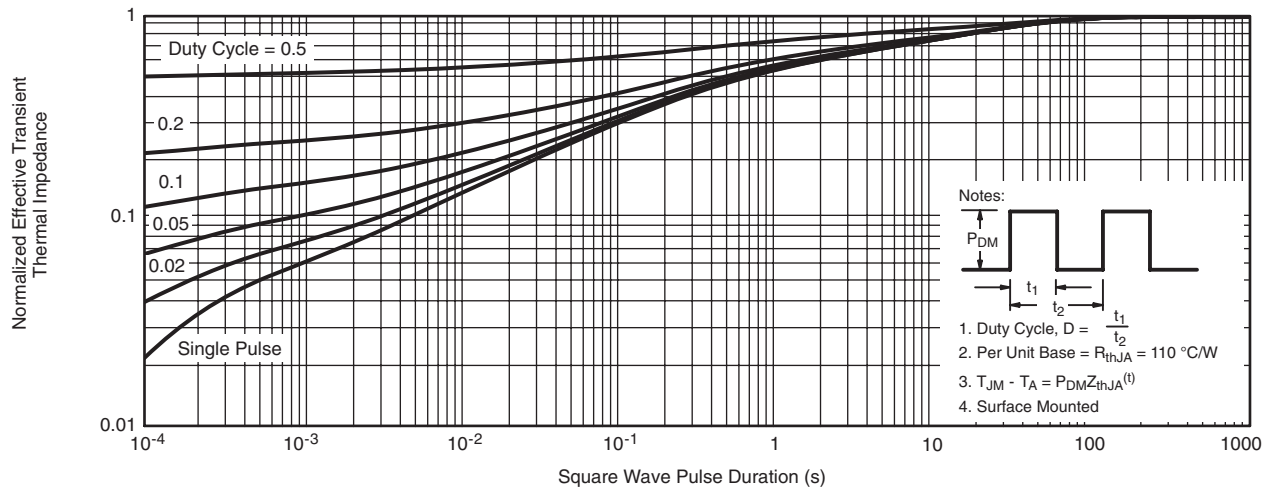
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

SCHOTTKY SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$I_F = 1\text{ A}$		0.36	0.44	V
		$I_F = 1\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$		0.29	0.35	
Maximum Reverse Leakage Current	I_{rm}	$V_R = 20\text{ V}$		0.025	0.200	mA
		$V_R = 20\text{ V}$, $T_J = 75\text{ }^{\circ}\text{C}$		0.41	4	
		$V_R = 20\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$		5	50	
Junction Capacitance	C_T	$V_R = 15\text{ V}$		60		pF

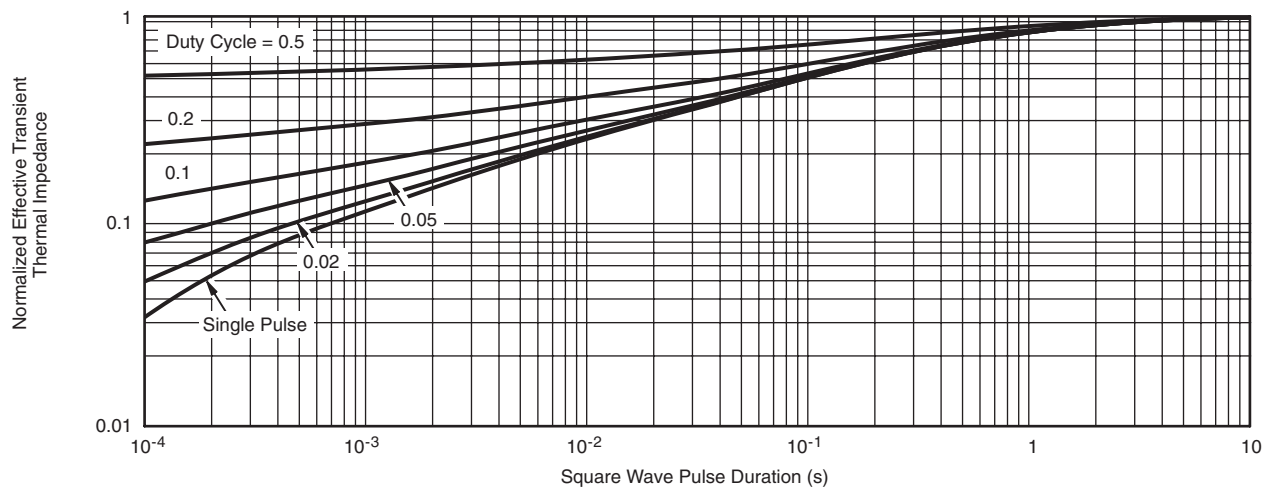
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

SCHOTTKY TYPICAL CHARACTERISTICS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted**Reverse Current vs. Junction Temperature****Forward Voltage Drop****Capacitance**

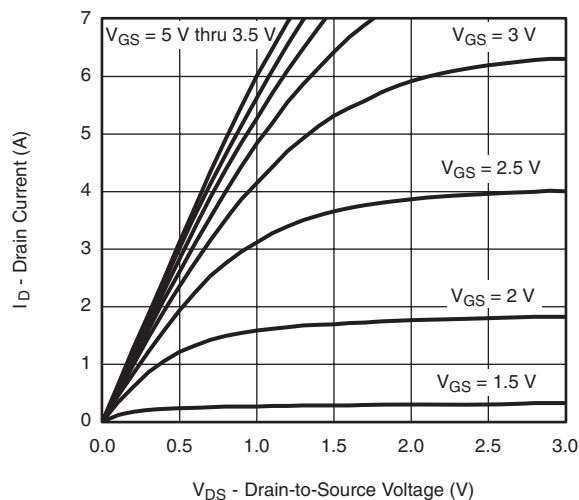
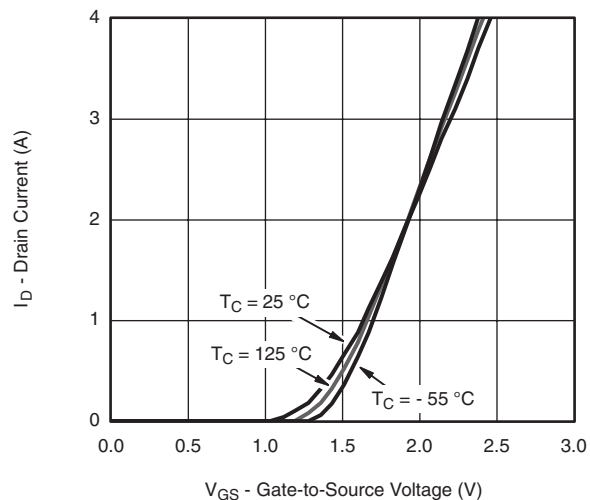
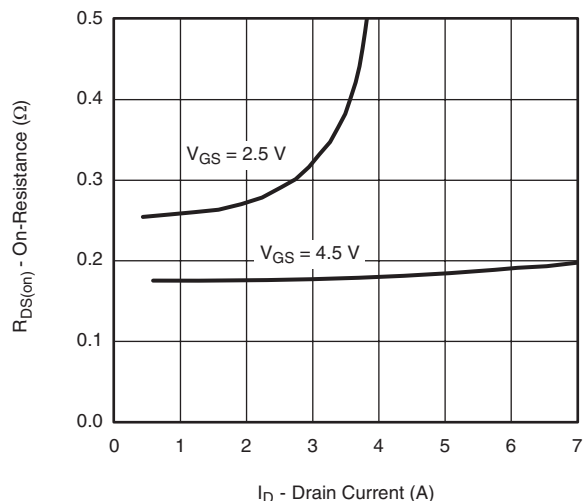
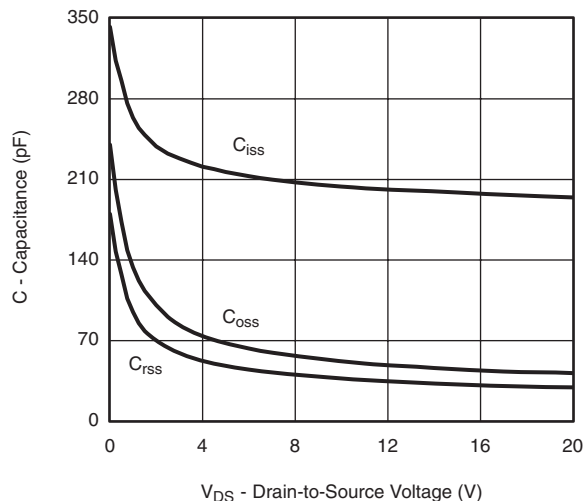
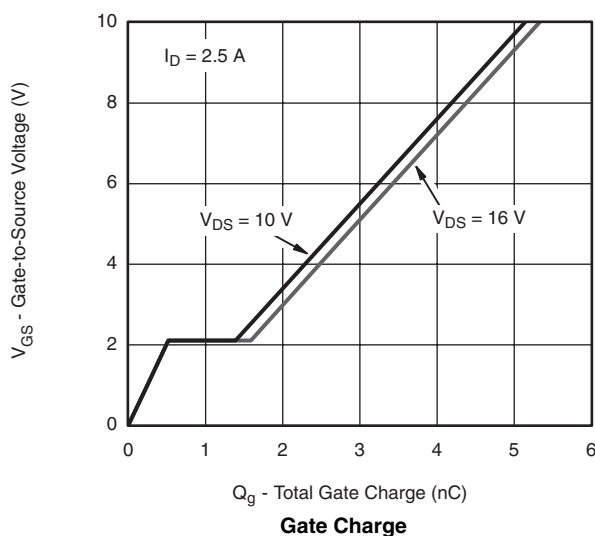
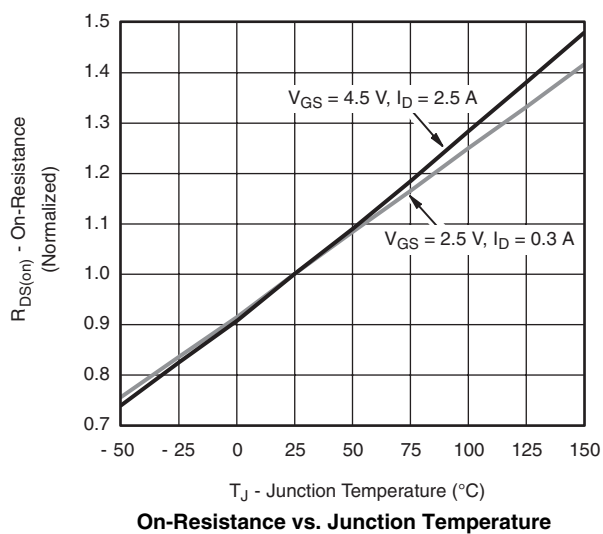
SCHOTTKY TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise noted



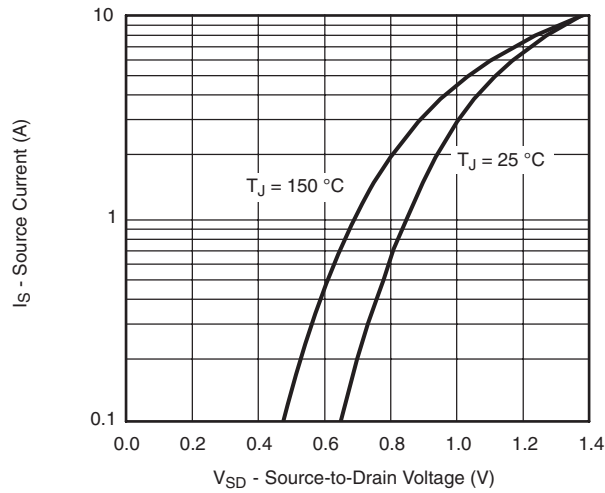
Normalized Thermal Transient Impedance, Junction-to-Ambient



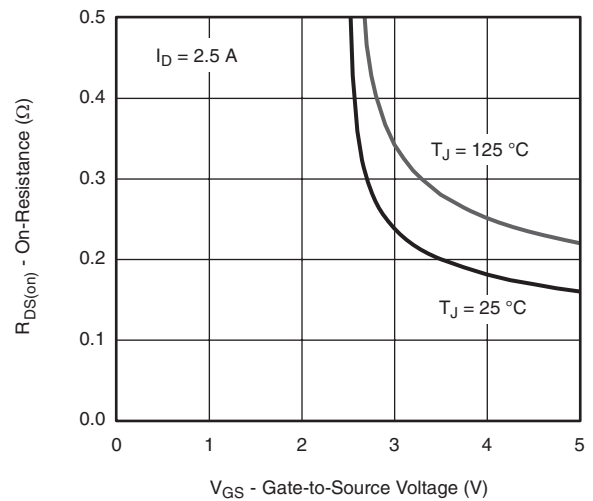
Normalized Thermal Transient Impedance, Junction-to-Foot

MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current and Gate Voltage

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

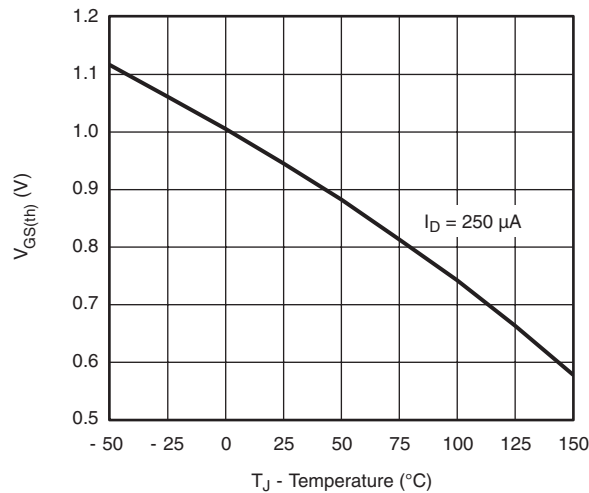
MOSFET TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise noted



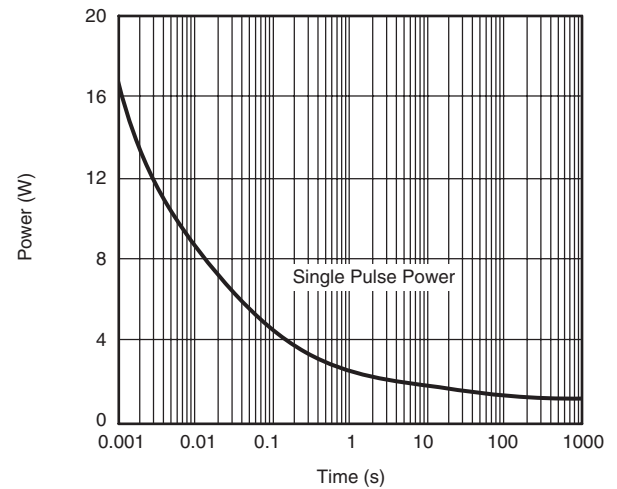
Source-Drain Diode Forward Voltage



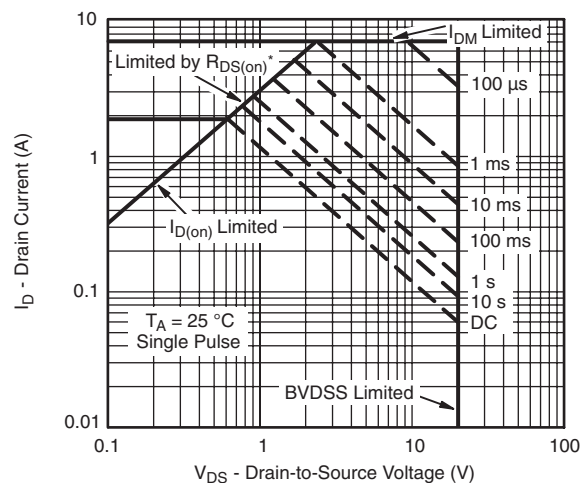
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

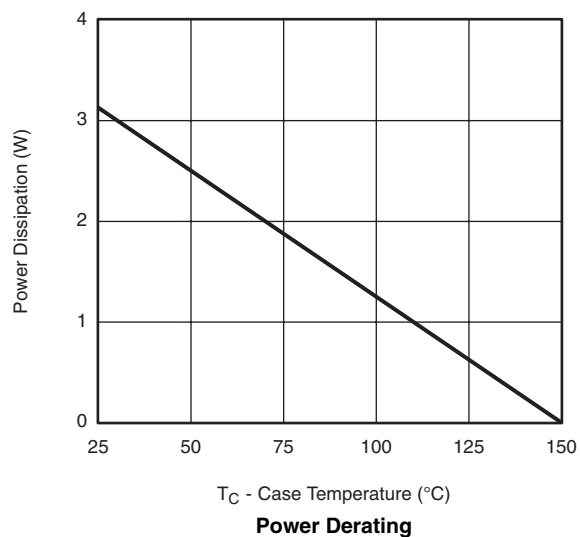
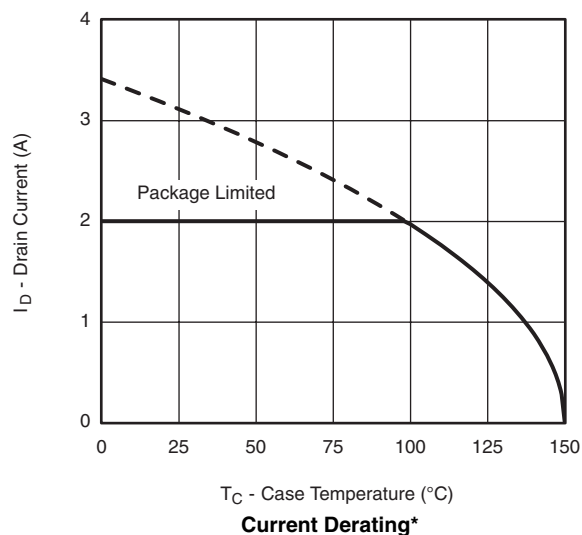


Single Pulse Power, Junction-to-Ambient



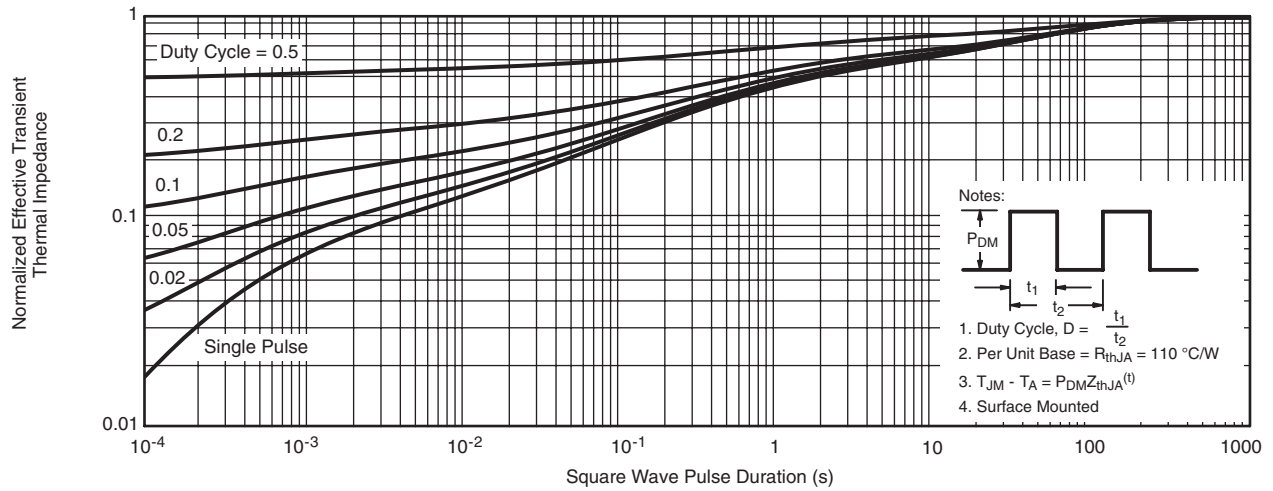
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

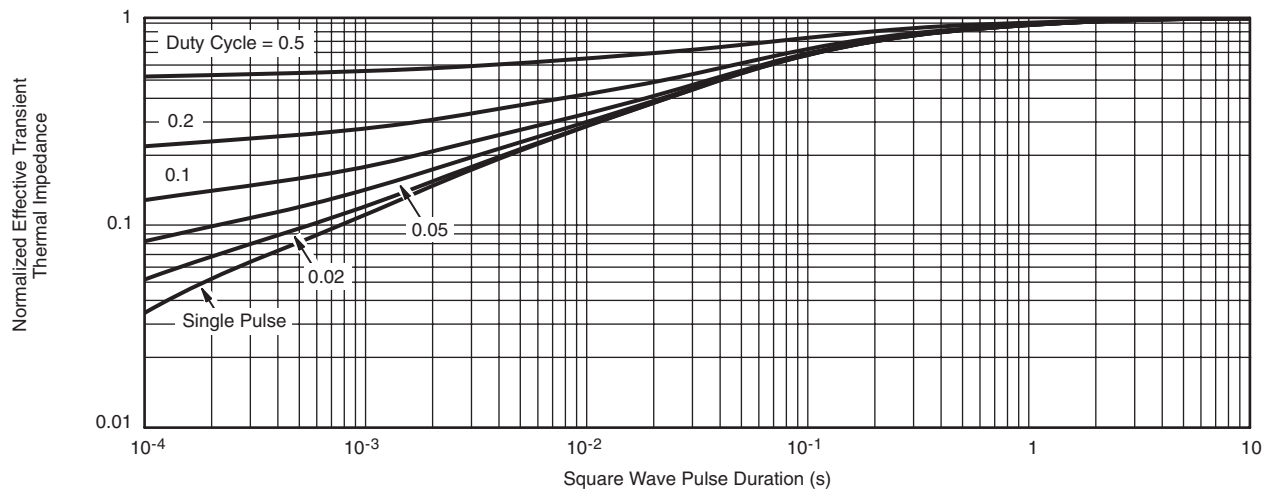
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

* The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^{\circ}\text{C}$, 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.

MOSFET TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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