

4513GH-A-VB Datasheet

N-and P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY				
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
N-Channel	60	0.030 at V _{GS} = 10 V	35	6 nC
		0.033 at V _{GS} = 4.5 V	30	
P-Channel	- 60	0.050 at V _{GS} = - 10 V	- 19	8 nC
		0.060 at V _{GS} = - 4.5 V	- 15	

FEATURES

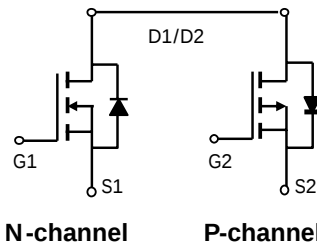
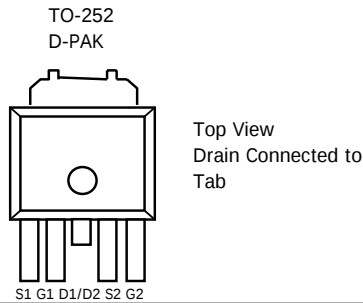
- Halogen-free According to IEC 61249-2-21 Available
- Trench Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

- CCFL Inverter



RoHS
COMPLIANT
HALOGEN
FREE
Available



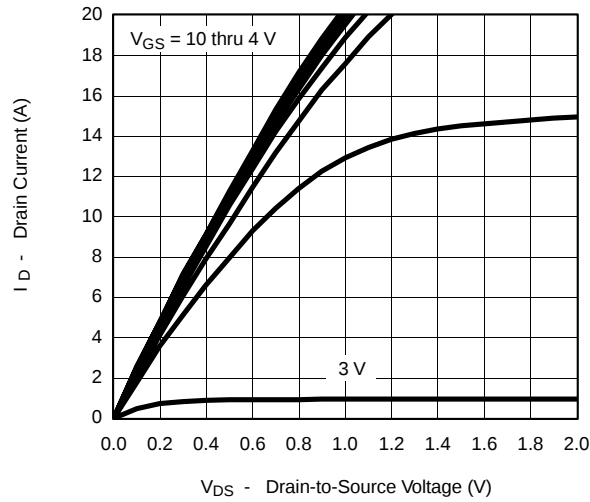
ABSOLUTE MAXIMUM RATINGS (TA = 25°C UNLESS OTHERWISE NOTED)					
Parameter	Symbol	Nch Limit	Pch Limit	Units	
Drain-Source Voltage	V _{DS}	60	-60	V	
Gate-Source Voltage	V _{GS}	±20	±20		
Continuous Drain Current ^a	I _D	35	-20	A	
Pulsed Drain Current ^b	I _{DM}	140	-80		
Continuous Source Current (Diode Conduction) ^a	I _S	35	-20	A	
Power Dissipation ^a	P _D	50	50	W	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	T _J , T _{stg}	-55 to 175	°C	

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient ^c	R _{θJA}	50	°C/W
Maximum Junction-to-Case	R _{θJC}	3	

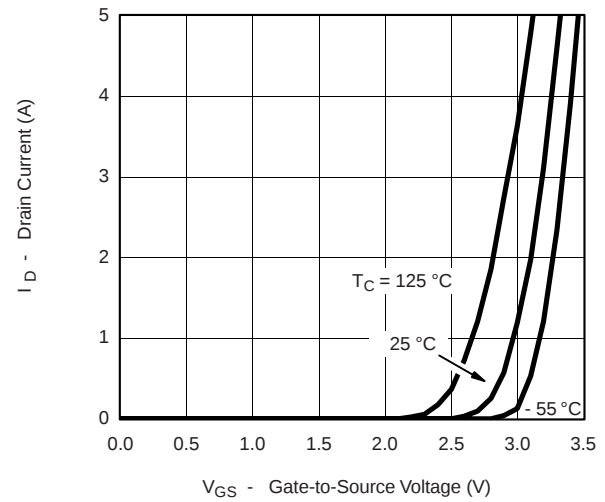
Notes

- Package Limited
- Pulse width limited by maximum junction temperature
- Surface Mounted on 1" x 1" FR4 Board.

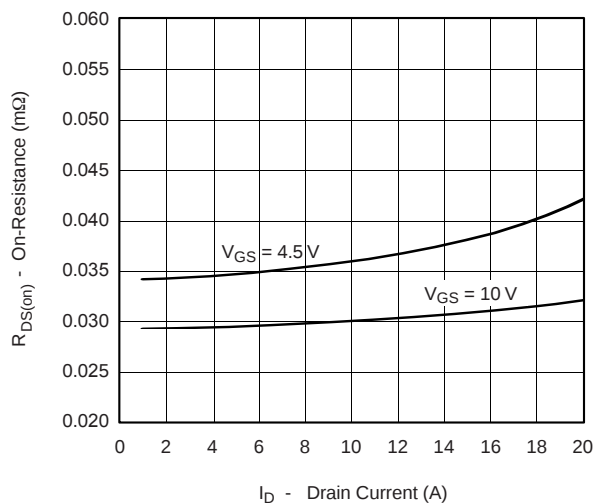
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \text{ }\mu\text{A}$	1		3	V
		$V_{DS} = V_{GS}, I_D = -250 \text{ }\mu\text{A}$	-1		-3	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}$			1	μA
		$V_{DS} = -48 \text{ V}, V_{GS} = 0 \text{ V}$			-1	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	45			A
		$V_{DS} = -5 \text{ V}, V_{GS} = -10 \text{ V}$	-25			A
Drain-Source On-Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}$		30		m Ω
		$V_{GS} = 4.5 \text{ V}, I_D = 16 \text{ A}$		33		
		$V_{GS} = -10 \text{ V}, I_D = -10 \text{ A}$		50		m Ω
		$V_{GS} = -4.5 \text{ V}, I_D = -8 \text{ A}$		60		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}, I_D = 20 \text{ A}$		15		S
		$V_{DS} = -15 \text{ V}, I_D = -10 \text{ A}$		11		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 17 \text{ A}, V_{GS} = 0 \text{ V}$		0.89		V
		$I_S = -10 \text{ A}, V_{GS} = 0 \text{ V}$		-0.98		V
Dynamic ^b						
Total Gate Charge	Q_g	N - Channel $V_{DS} = 30 \text{ V}, V_{GS} = 4.5 \text{ V},$ $I_D = 20 \text{ A}$		9		nC
Gate-Source Charge	Q_{gs}			3		
Gate-Drain Charge	Q_{gd}			4		
Turn-On Delay Time	$t_{d(on)}$	N - Channel $V_{DS} = 30 \text{ V}, R_L = 1.5 \text{ }\Omega,$ $I_D = 20 \text{ A},$ $V_{GEN} = 10 \text{ V}, R_{GEN} = 6 \text{ }\Omega$		5		ns
Rise Time	t_r			5		
Turn-Off Delay Time	$t_{d(off)}$			27		
Fall Time	t_f			8		
Input Capacitance	C_{iss}	N - Channel $V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ Mhz}$		1500		pF
Output Capacitance	C_{oss}			84		
Reverse Transfer Capacitance	C_{rss}			79		
Total Gate Charge	Q_g	P - Channel $V_{DS} = -30 \text{ V}, V_{GS} = 4.5 \text{ V},$ $I_D = -10 \text{ A}$		10		nC
Gate-Source Charge	Q_{gs}			5		
Gate-Drain Charge	Q_{gd}			4		
Turn-On Delay Time	$t_{d(on)}$	P - Channel $V_{DS} = -30 \text{ V}, R_L = 3 \text{ }\Omega,$ $I_D = -10 \text{ A},$ $V_{GEN} = -10 \text{ V}, R_{GEN} = 6 \text{ }\Omega$		5		ns
Rise Time	t_r			4		
Turn-Off Delay Time	$t_{d(off)}$			30		
Fall Time	t_f			11		
Input Capacitance	C_{iss}	P - Channel $V_{DS} = -15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ Mhz}$		1180		pF
Output Capacitance	C_{oss}			84		
Reverse Transfer Capacitance	C_{rss}			60		

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


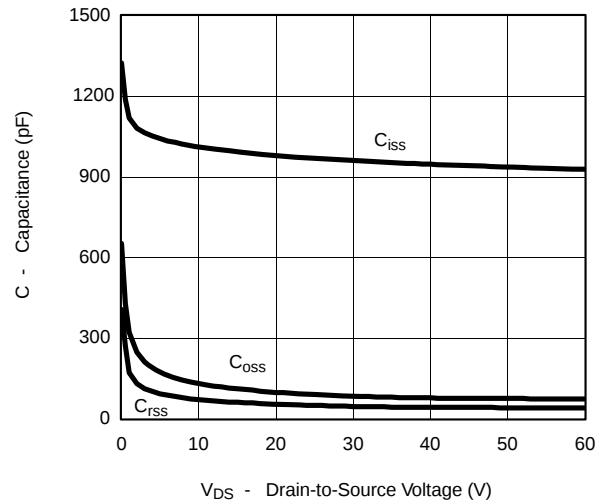
Output Characteristics



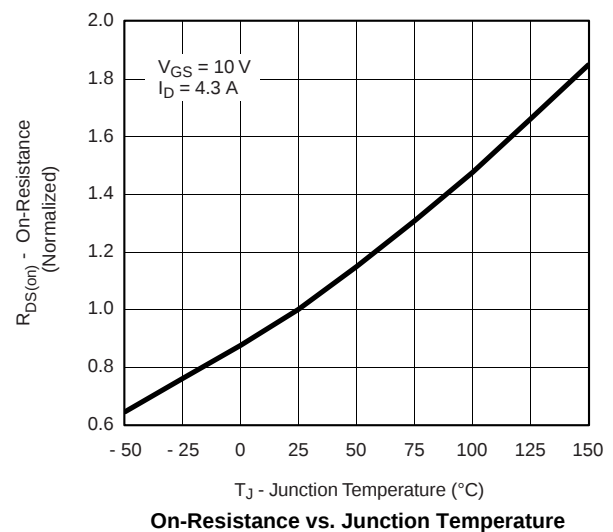
Transfer Characteristics



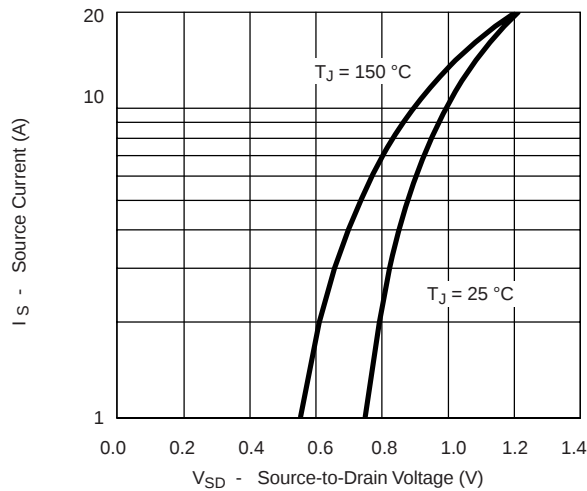
On-Resistance vs. Drain Current and Gate Voltage



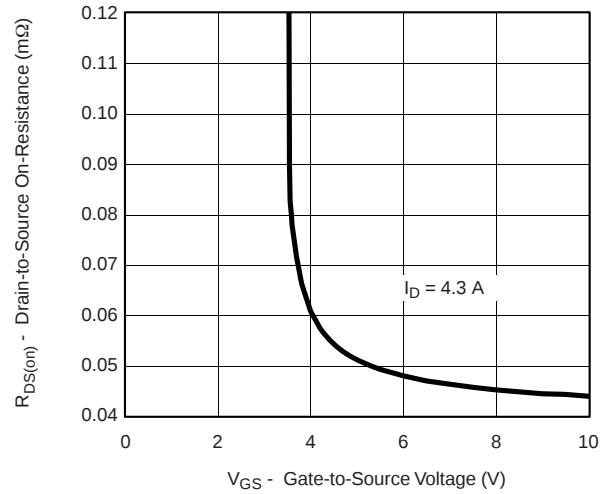
Capacitance



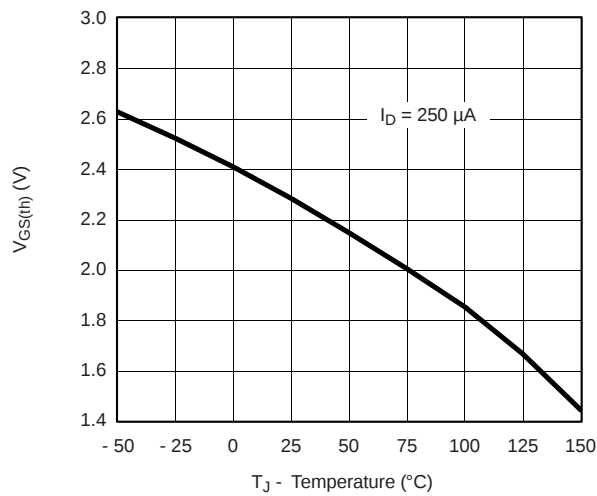
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



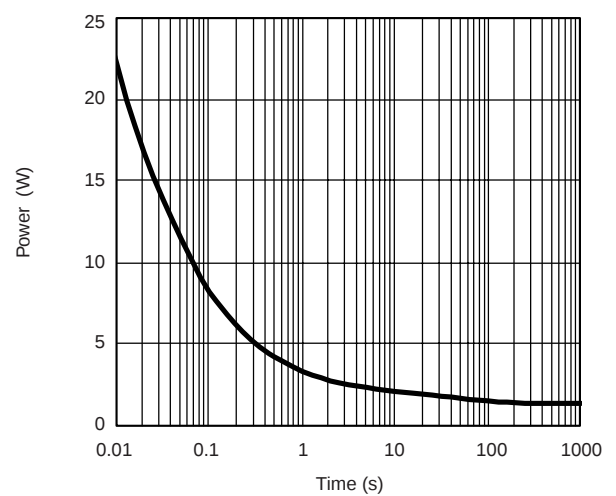
Source-Drain Diode Forward Voltage



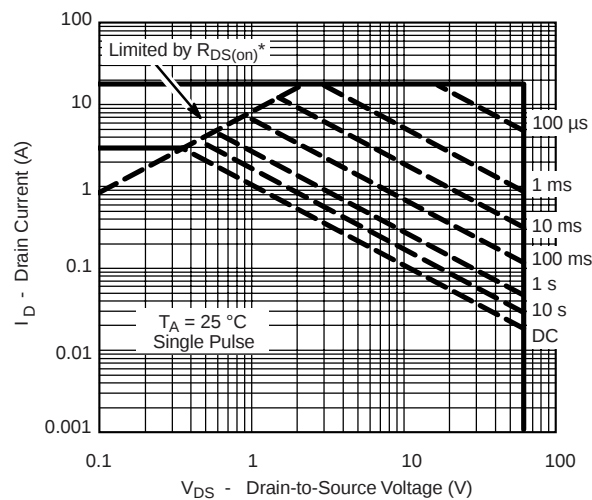
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

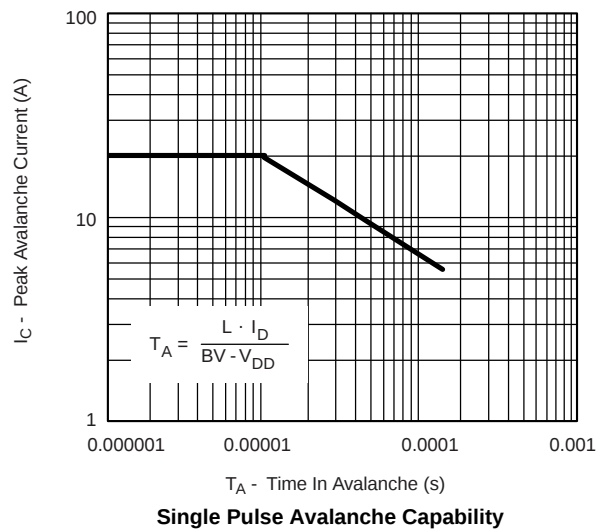
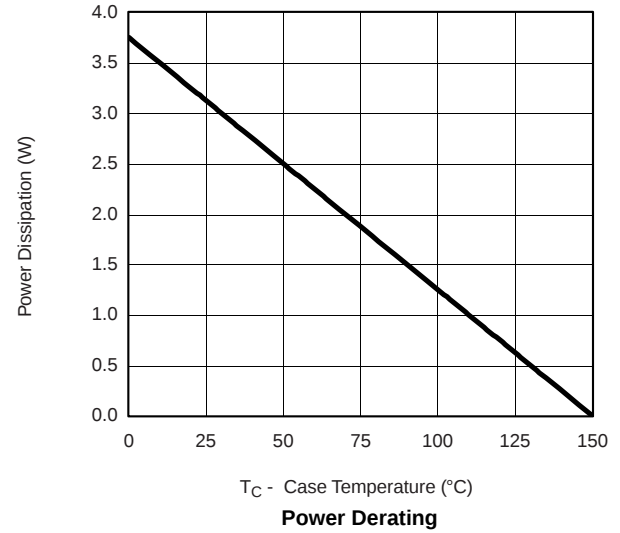
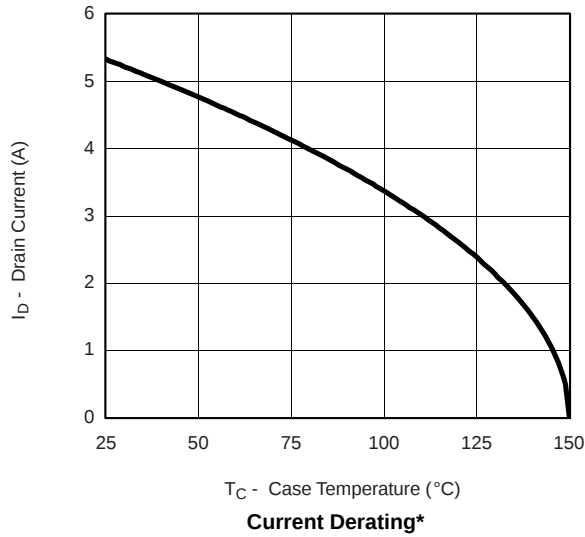


Single Pulse Power, Junction-to-Ambient



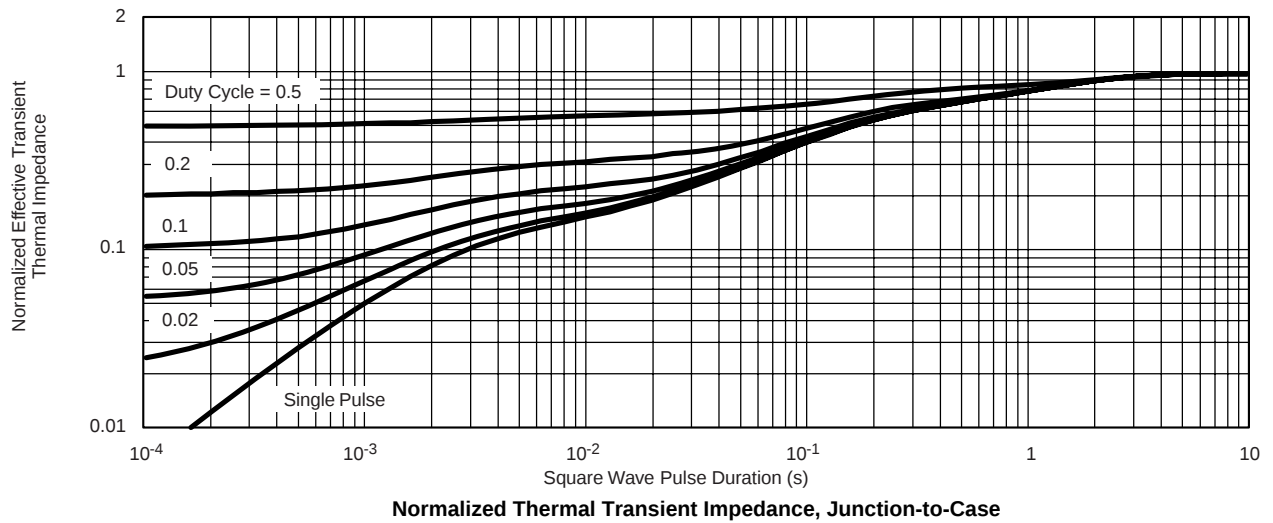
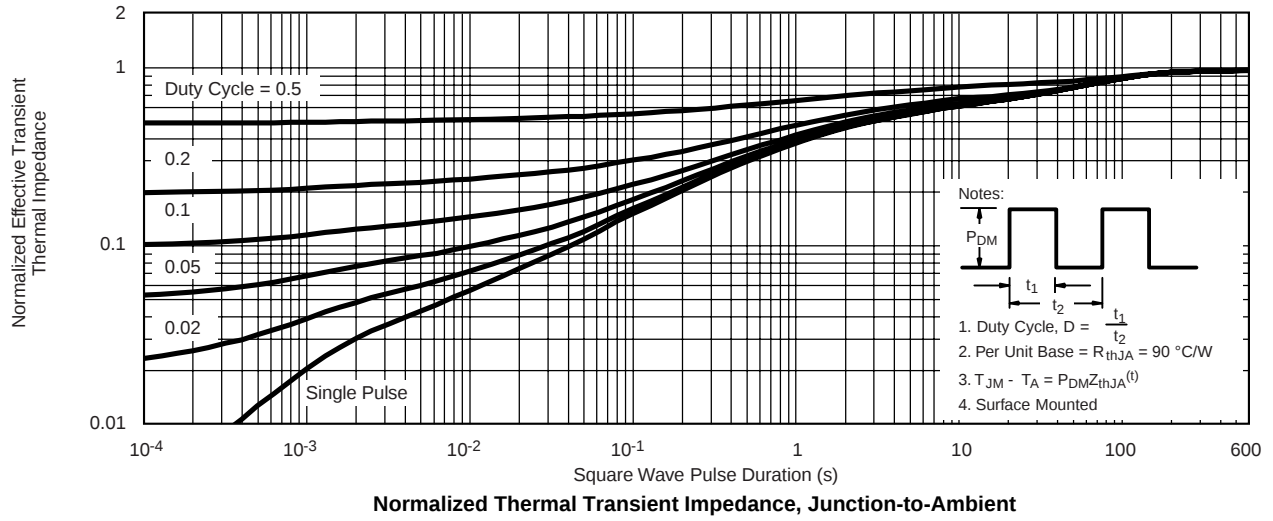
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

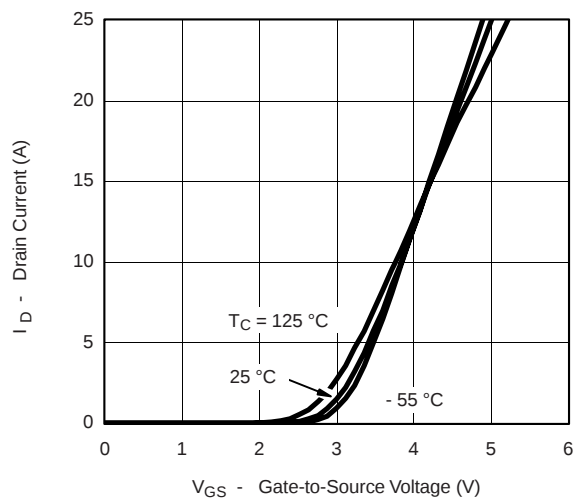
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


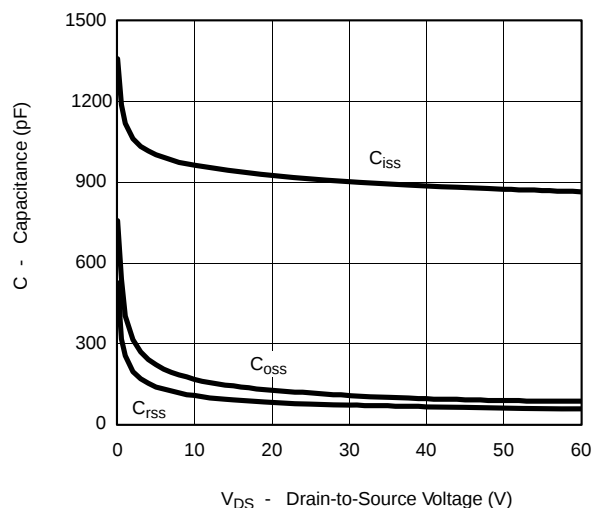
* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

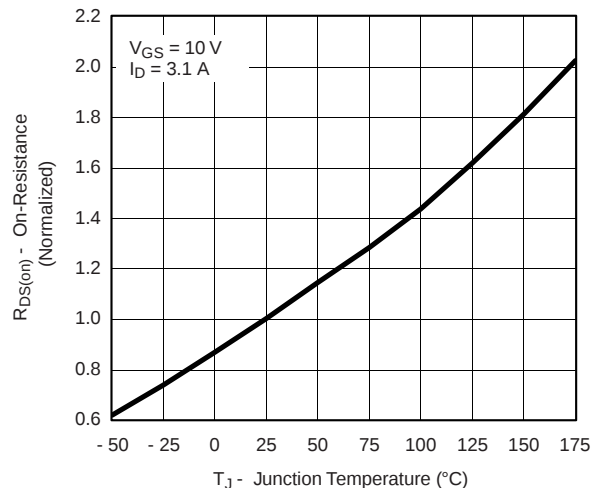
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

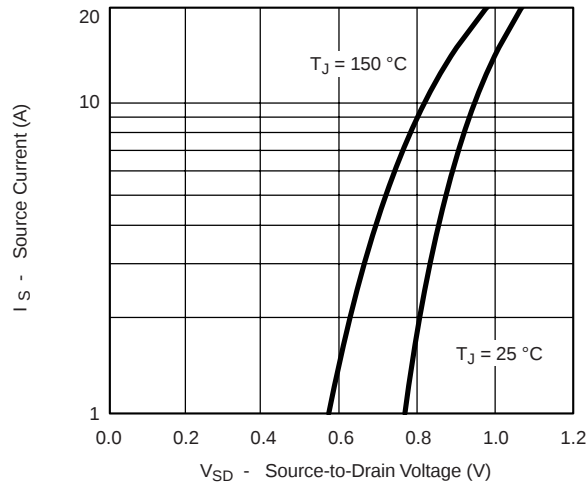
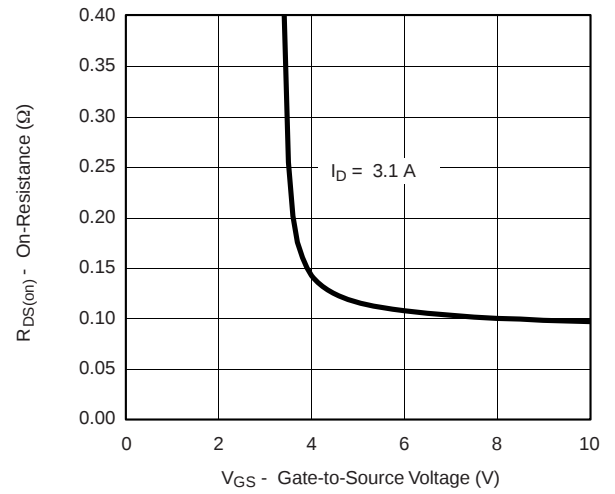
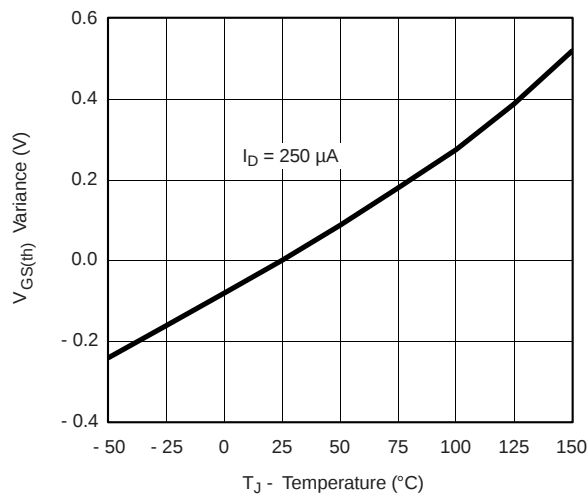


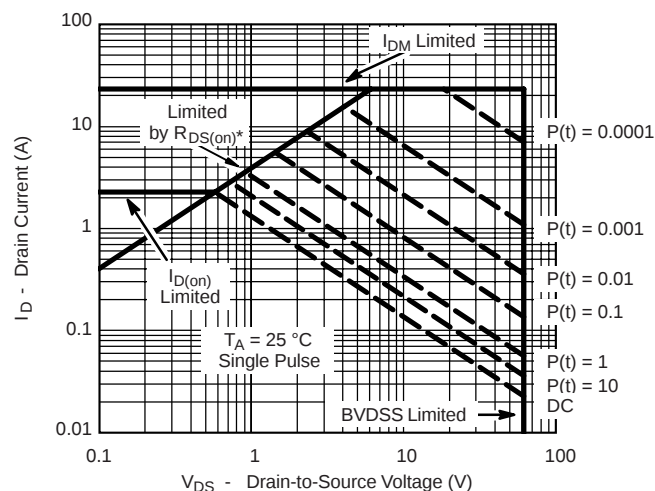
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

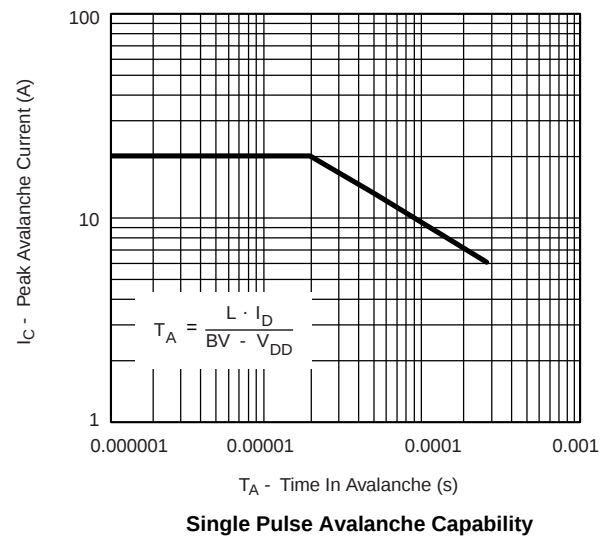
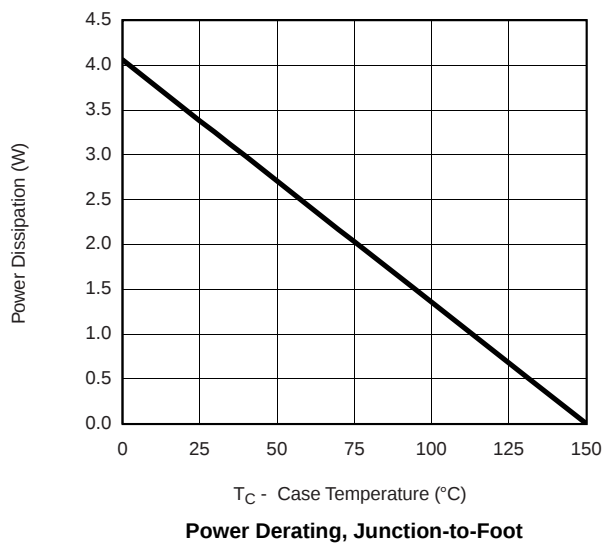
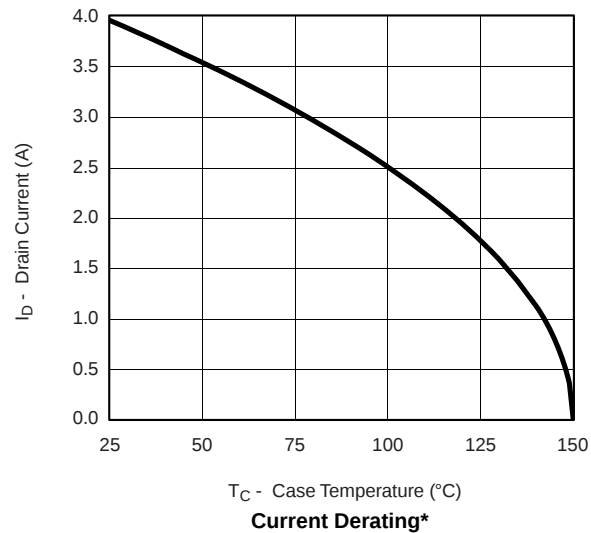
Gate Charge

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


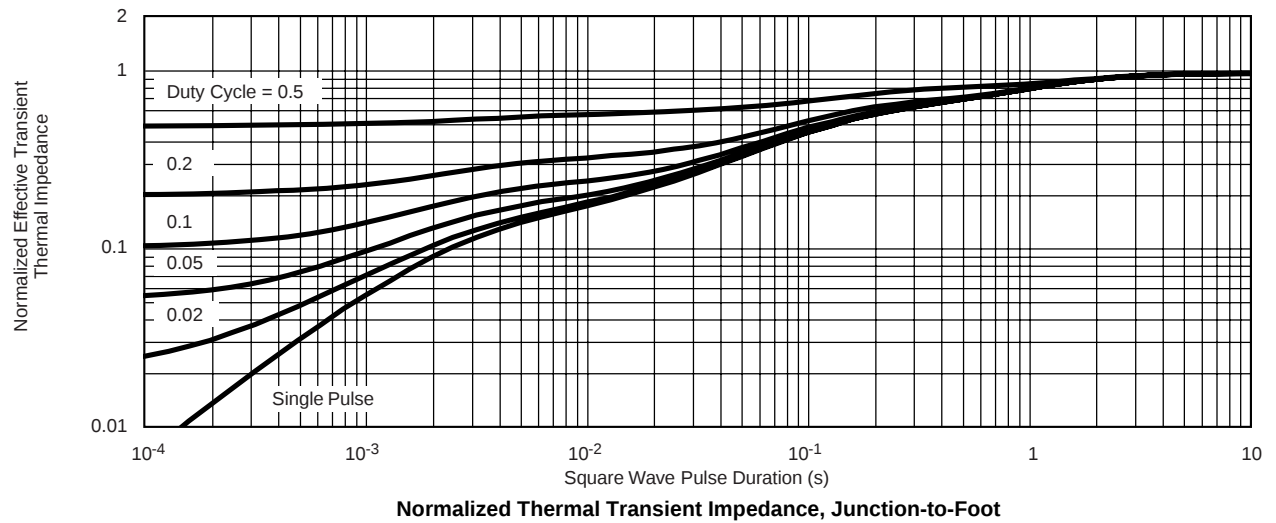
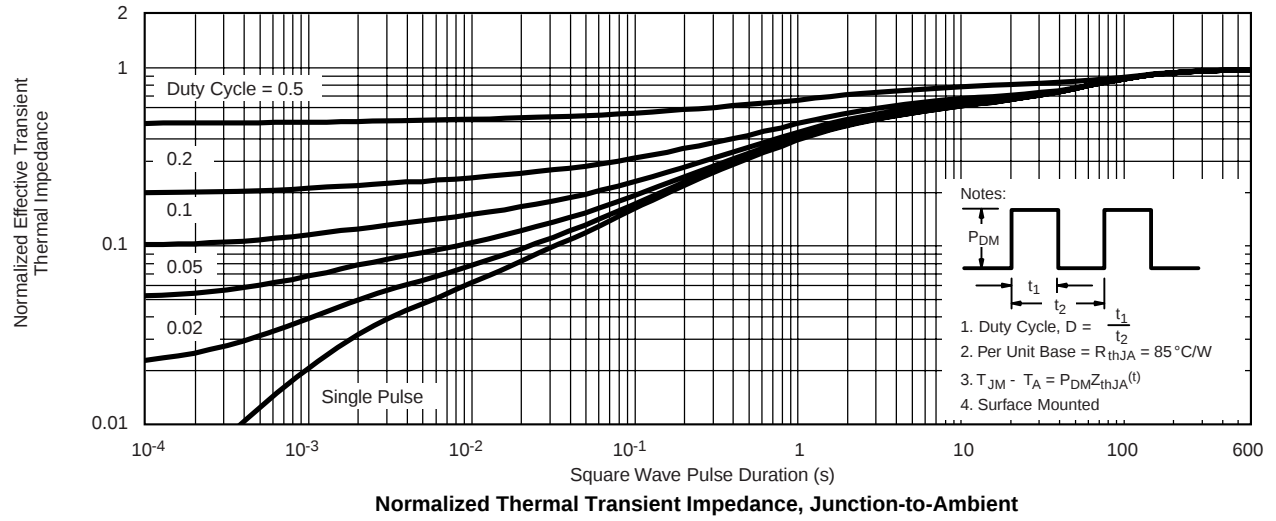
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case

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


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



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