Complementary 30-V (D-S) MOSFET

PRODUCT SUMMARY			
	V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
P-Channel	- 30	0.051 at V_{GS} = - 10 V	- 6.4
		0.075 at V_{GS} = - 6 V	- 5.3
N-Channel	30	0.035 at V_{GS} = 10 V	7.7
		0.050 at V_{GS} = 4.5 V	6.5

FEATURES

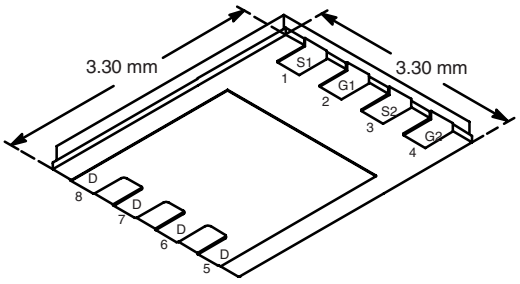
- **Halogen-free Option Available**
- TrenchFET® Power MOSFET
- New Low Thermal Resistance
- PowerPAK® Package with Low 1.07 mm Profile

Pb-free
RoHS COMPLIANT

APPLICATIONS

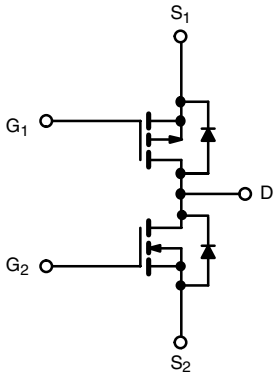
- Backlight Inverter
- DC/DC Converter
  - 4 Cell Battery

PowerPAK 1212-8



Bottom View

Ordering Information: Si7501DN-T1-E3 (Lead (Pb)-free)
Si7501DN-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel

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

Parameter		Symbol	P-Channel		N-Channel		Unit
			10 s	Steady State	10 s	Steady State	
Drain-Source Voltage		V_{DS}	- 30		30		V
Gate-Source Voltage		V_{GS}	± 25		± 20		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	- 6.4	- 4.5	7.7	5.4	A
	T_A = 70 °C		- 5.1	- 3.6	4.7	4.3	
Pulsed Drain Current		I_{DM}	- 25		25		
Continuous Source Current (Diode Conduction)[a]		I_S	- 2.6	- 1.3	2.6	1.3	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	3.1	1.6	3.1	1.6	W
	T_A = 70 °C		3	1.0	2	1.0	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150				°C
Soldering Recommendations (Peak Temperature)[b, c]			260				

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a]	t ≤ 10 s	R_{thJA}	32	40	°C/W
	Steady State		65	81	
Maximum Junction-to-Foot (Case)	Steady State	R_{thJC}	5	6.3	

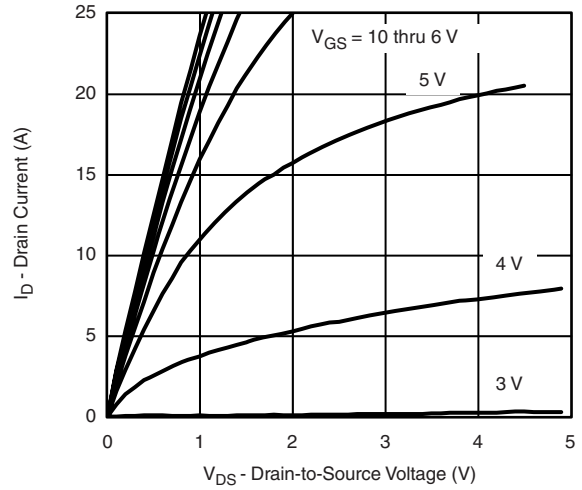
Notes:
a. Surface Mounted on 1" x 1" FR4 board.
b. See Solder Profile (*http://www.vishay.com/ppg?73257*). The PowerPAK 1212-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted							
Parameter	**Symbol**	**Test Conditions**		**Min.**	**Typ.**	**Max.**	**Unit**
Static							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250$ µA	P-Ch	- 1.0		- 3	V
		$V_{DS} = V_{GS}$, $I_D = 250$ µA	N-Ch	1.0		3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 25$ V	P-Ch			± 200	nA
		$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V	N-Ch			± 100	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30$ V, $V_{GS} = 0$ V	P-Ch			- 1	µA
		$V_{DS} = 30$ V, $V_{GS} = 0$ V	N-Ch			1	
		$V_{DS} = -30$ V, $V_{GS} = 0$ V, $T_J = 55$ °C	P-Ch			- 5	
		$V_{DS} = 30$ V, $V_{GS} = 0$ V, $T_J = 55$ °C	N-Ch			5	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq -5$ V, $V_{GS} = -10$ V	P-Ch	- 25			A
		$V_{DS} \leq 5$ V, $V_{GS} = 10$ V	N-Ch	25			
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	$V_{GS} = -10$ V, $I_D = -6.4$ A	P-Ch		0.041	0.051	Ω
		$V_{GS} = 10$ V, $I_D = 7.7$ A	N-Ch		0.028	0.035	
		$V_{GS} = -6$ V, $I_D = -5.3$ A	P-Ch		0.055	0.075	
		$V_{GS} = 4.5$ V, $I_D = 6.5$ A	N-Ch		0.040	0.050	
Forward Transconductance[a]	g_{fs}	$V_{DS} = -15$ V, $I_D = -6.4$ A	P-Ch		13		S
		$V_{DS} = 15$ V, $I_D = 7.7$ A	N-Ch		15		
Diode Forward Voltage[a]	V_{SD}	$I_S = -1.7$ A, $V_{GS} = 0$ V	P-Ch		- 0.80	- 1.2	V
		$I_S = 1.7$ A, $V_{GS} = 0$ V	N-Ch		0.80	1.2	
Dynamic[b]							
Total Gate Charge	Q_g	P-Channel $V_{DS} = -15$ V, $V_{GS} = -10$ V, $I_D = -6.4$ A N-Channel $V_{DS} = 15$ V, $V_{GS} = 10$ V, $I_D = 7.7$ A	P-Ch		12.5	19	nC
			N-Ch		9	14	
Gate-Source Charge	Q_{gs}		P-Ch		2.5		
			N-Ch		2		
Gate-Drain Charge	Q_{gd}		P-Ch		3.6		
			N-Ch		1.3		
Gate Resistance	R_g		P-Ch		9		Ω
			N-Ch		3		
Turn-On Delay Time	$t_{d(on)}$	P-Channel $V_{DD} = -15$ V, $R_L = 5$ Ω $I_D \cong -3$ A, $V_{GEN} = -10$ V, $R_G = 1$ Ω N-Channel $V_{DD} = 15$ V, $R_L = 5$ Ω $I_D \cong 3$ A, $V_{GEN} = 10$ V, $R_G = 1$ Ω	P-Ch		10	15	ns
			N-Ch		10	15	
Rise Time	t_r		P-Ch		20	30	
			N-Ch		15	25	
Turn-Off Delay Time	$t_{d(off)}$		P-Ch		25	40	
			N-Ch		20	30	
Fall Time	t_f		P-Ch		30	45	
			N-Ch		10	15	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -1.7$ A, dI/dt = 100 A/µs	P-Ch		25	50	
		$I_F = 1.7$ A, dI/dt = 100 A/µs	N-Ch		20	40	

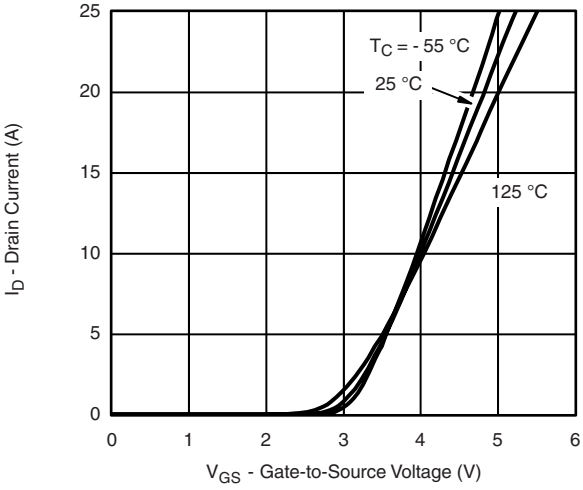
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

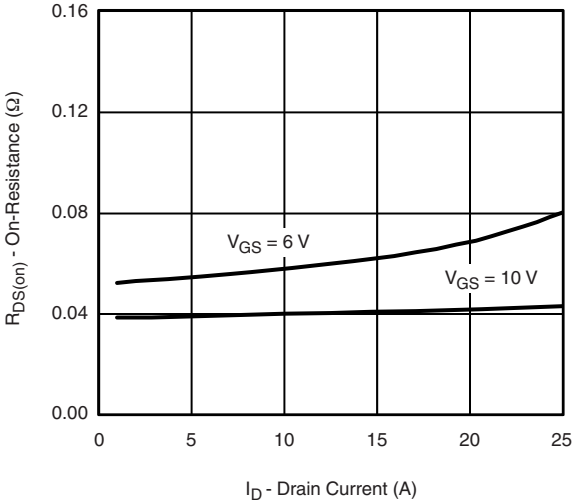
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



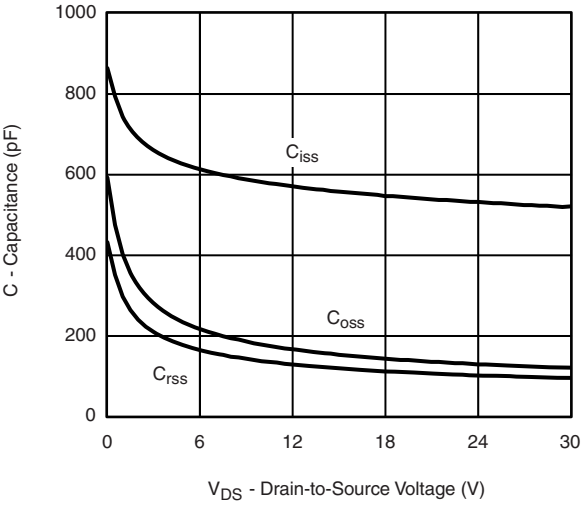
Output Characteristics



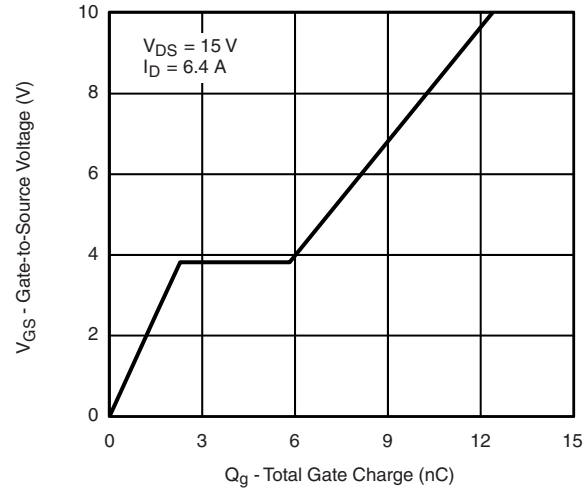
Transfer Characteristics



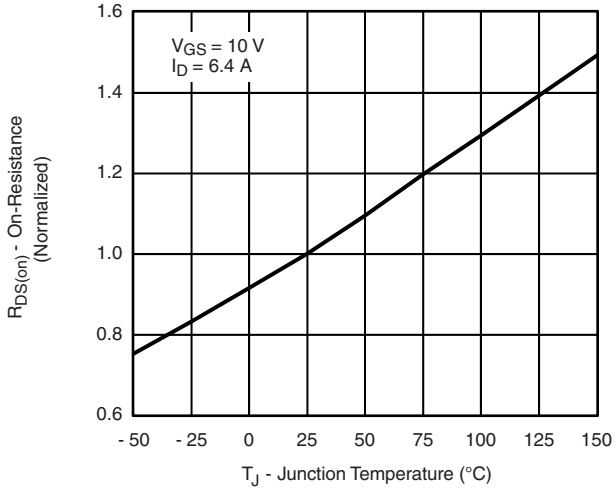
On-Resistance vs. Drain Current



Capacitance

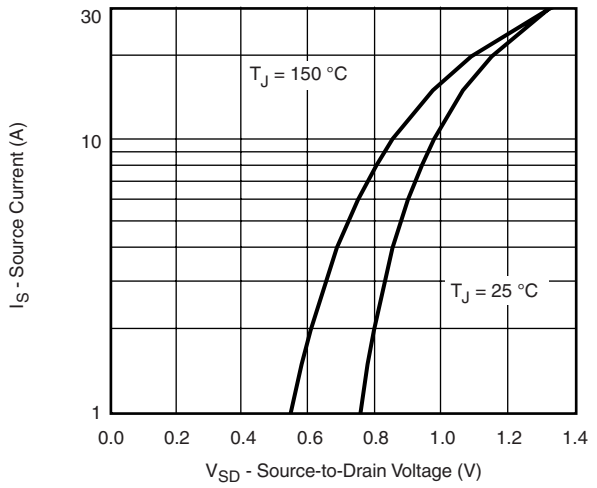


Gate Charge

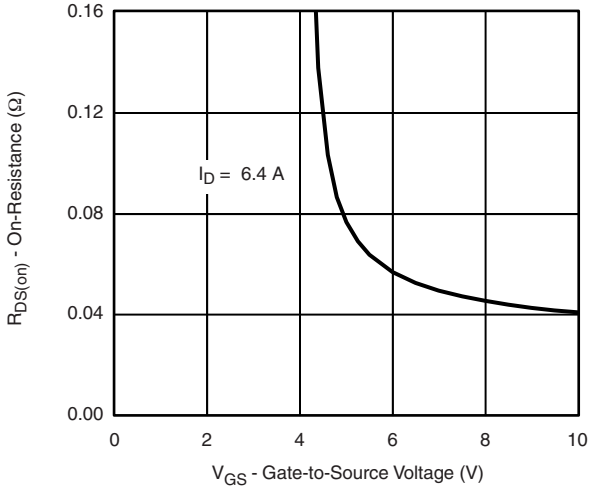


On-Resistance vs. Junction Temperature

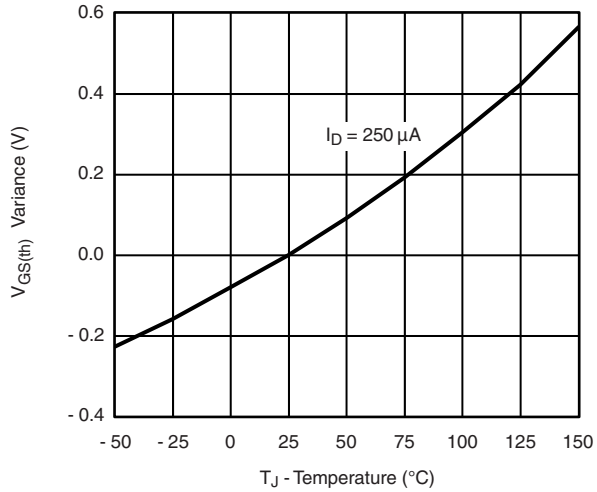
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



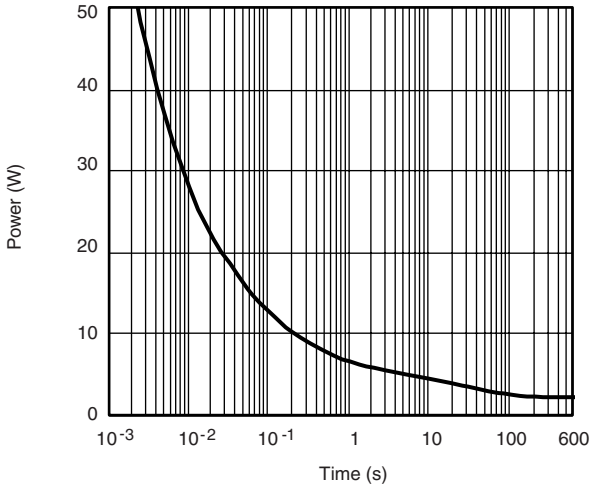
Source-Drain Diode Forward Voltage



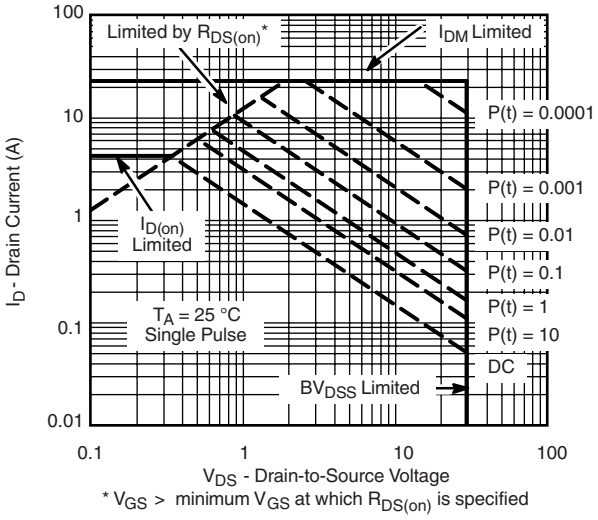
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

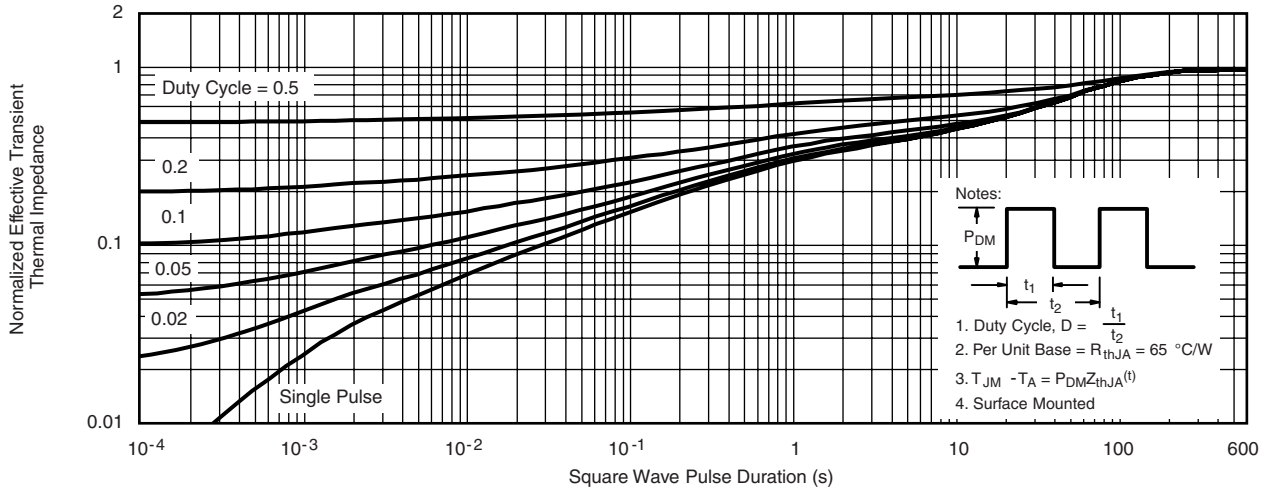


Single Pulse Power

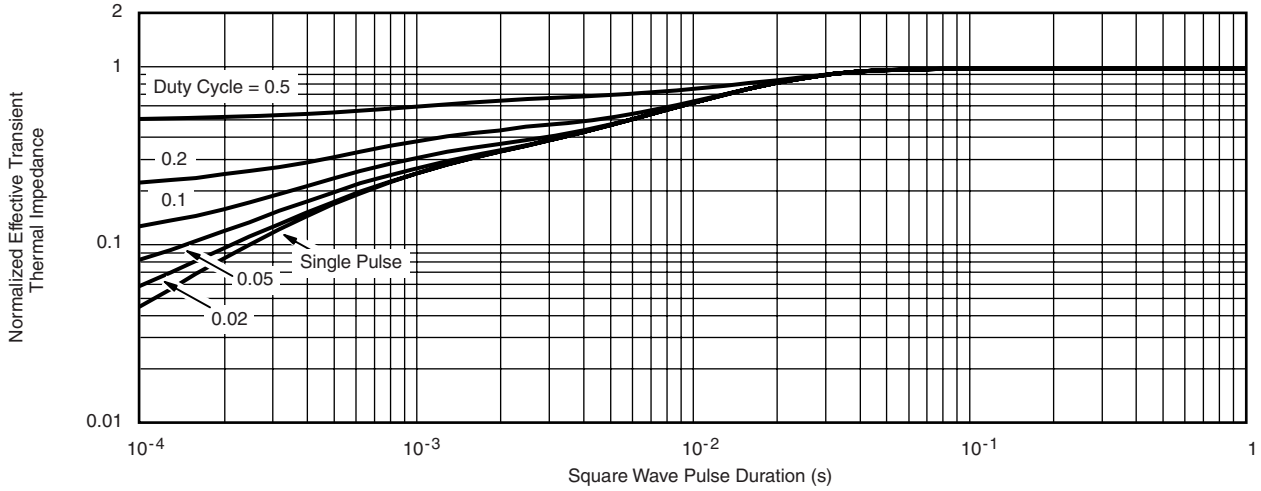


Safe Operating Area

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

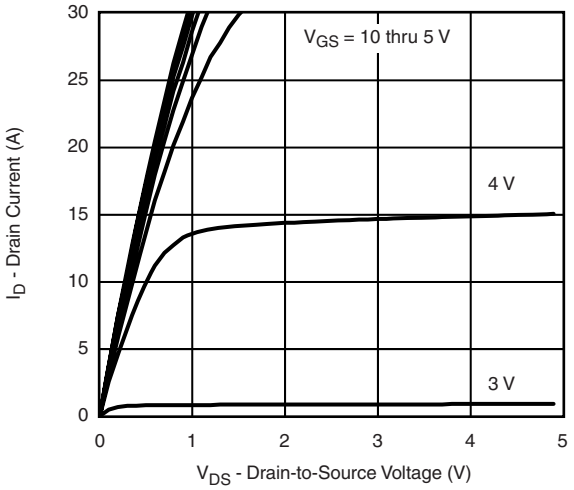


Normalized Thermal Transient Impedance, Junction-to-Ambient

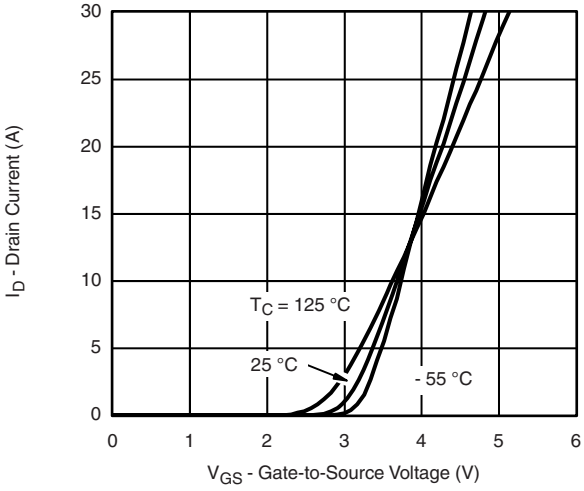


Normalized Thermal Transient Impedance, Junction-to-Case

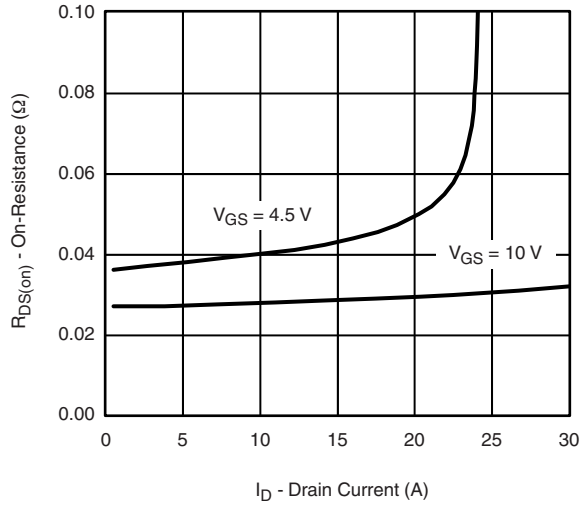
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



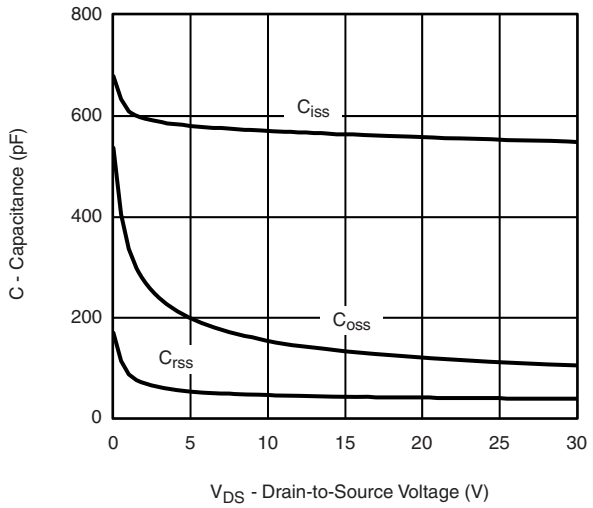
Output Characteristics



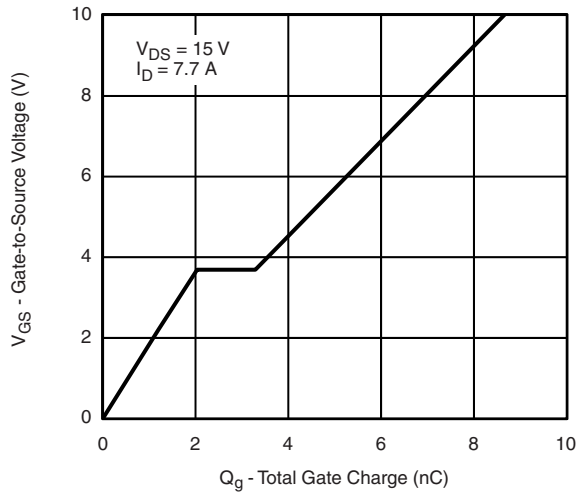
Transfer Characteristics



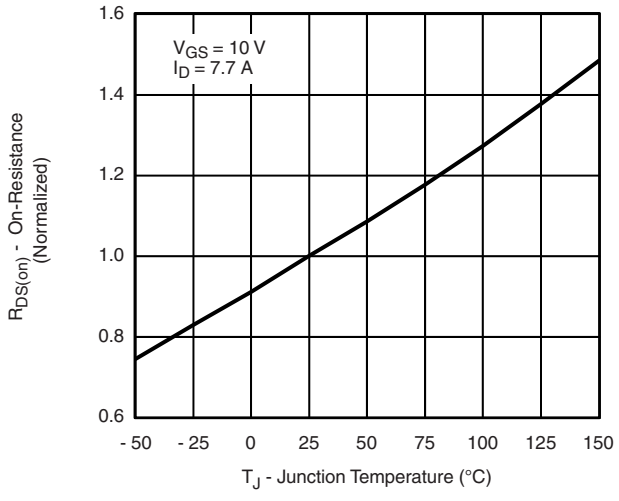
On-Resistance vs. Drain Current



Capacitance

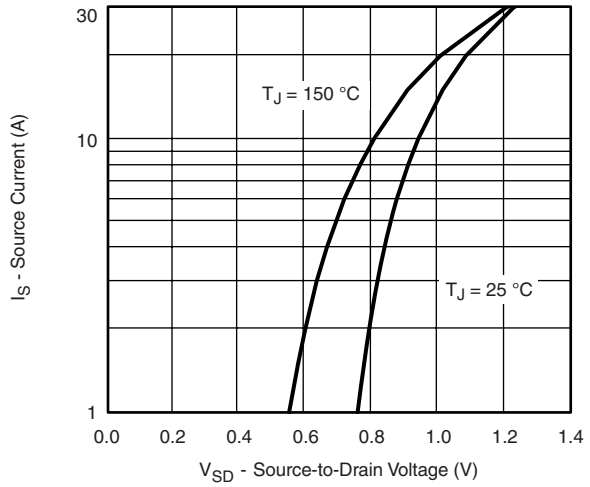


Gate Charge

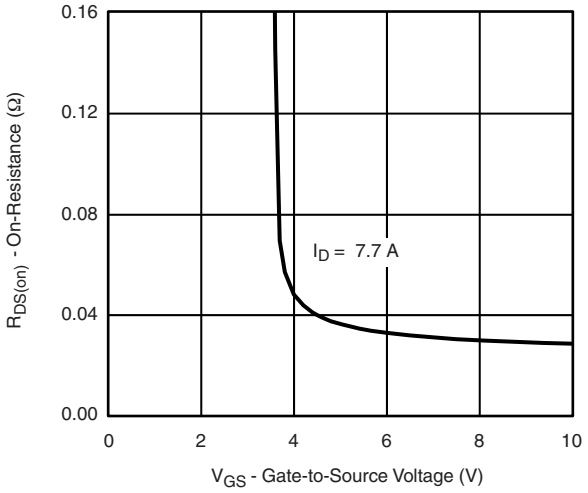


On-Resistance vs. Junction Temperature

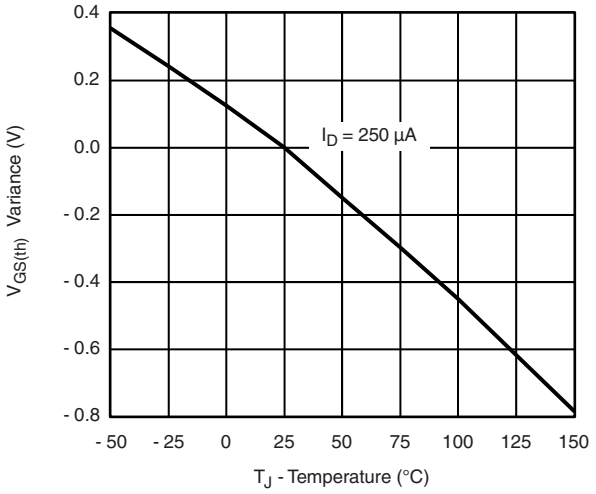
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



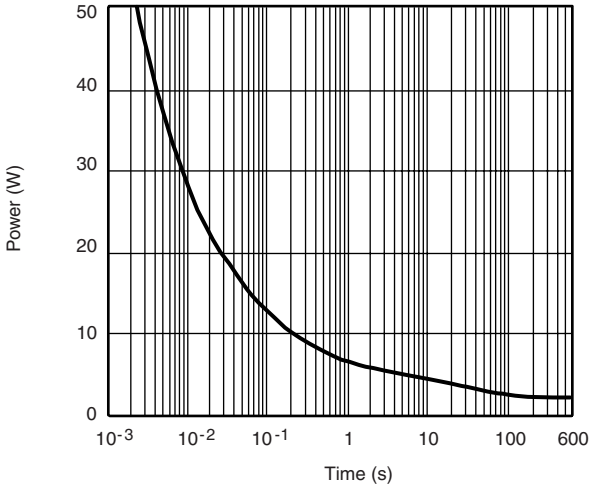
Source-Drain Diode Forward Voltage



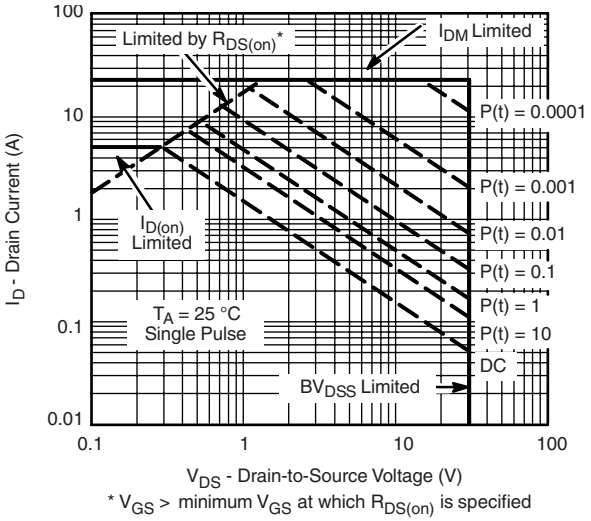
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



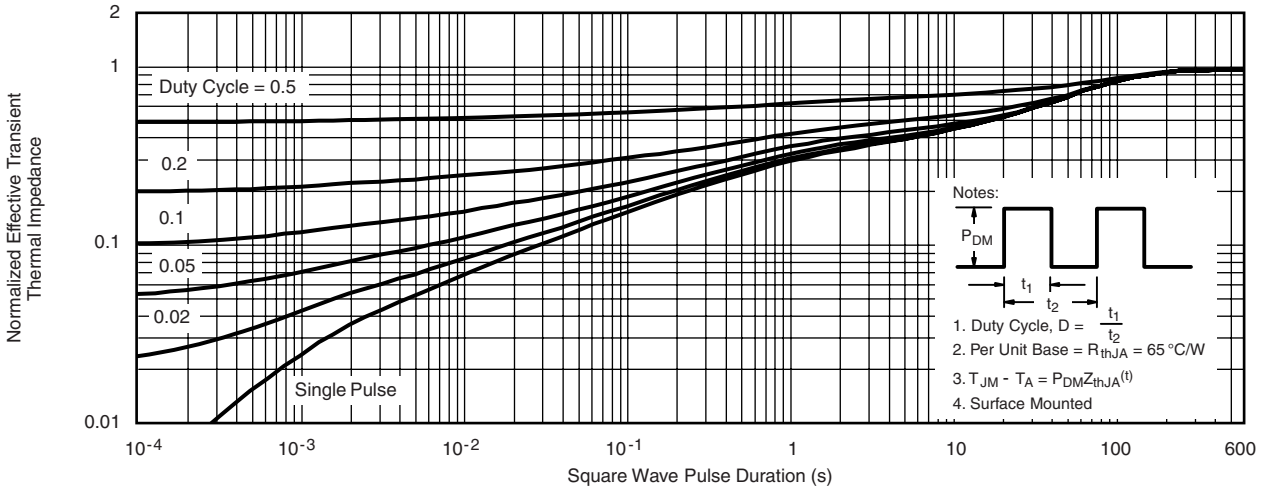
Single Pulse Power



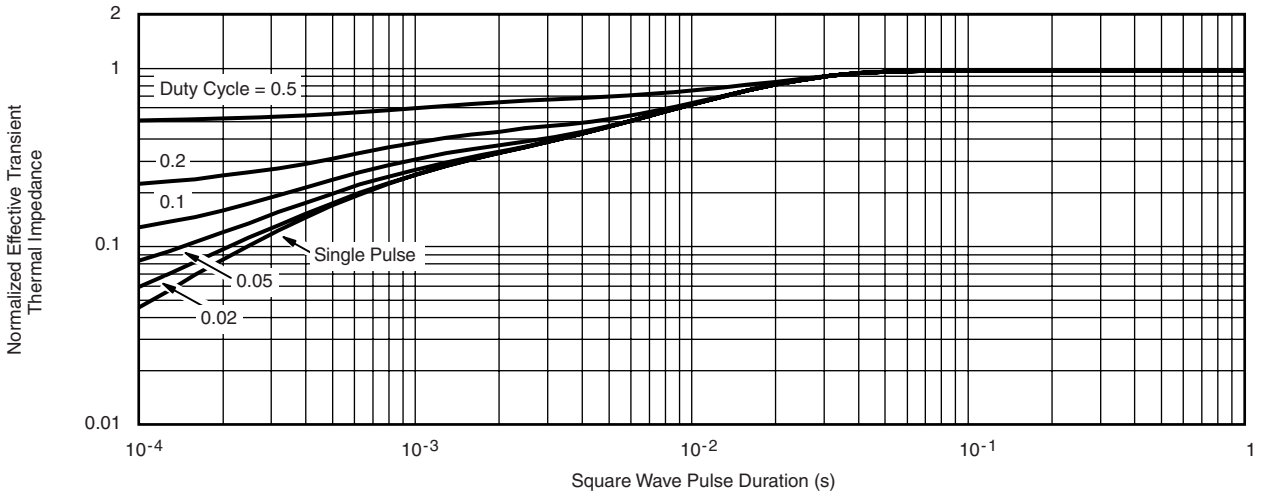
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

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



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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