



N-Channel 30-V (D-S) MOSFETs

PRODUCT SUMMARY

	V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
Channel-1	30	0.024 at $V_{GS} = 10$ V	12 ^a	3.8 nC
		0.030 at $V_{GS} = 4.5$ V	12 ^a	
Channel-2	30	0.0135 at $V_{GS} = 10$ V	16 ^a	7.3 nC
		0.017 at $V_{GS} = 4.5$ V	16 ^a	

FEATURES

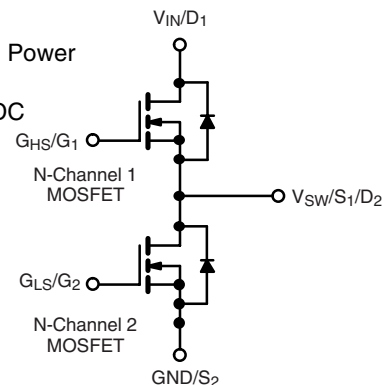
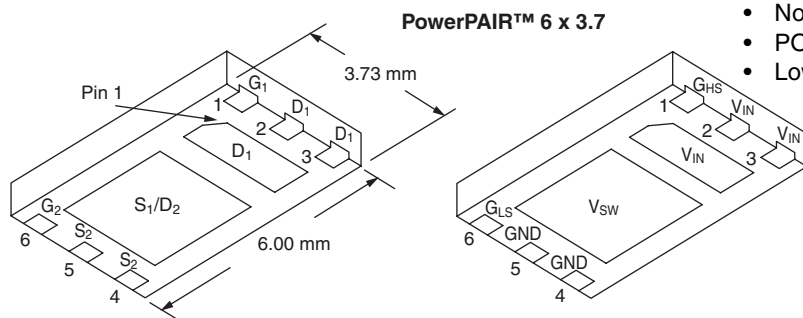
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFETs
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Notebook System Power
- POL
- Low Current DC/DC



Ordering Information: SiZ704DT-T1-GE3 (Lead (Pb)-free and Halogen-free)

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

Parameter		Symbol	Channel-1	Channel-2	Unit
Drain-Source Voltage		V _{DS}	30	30	V
Gate-Source Voltage		V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	12 ^a	16 ^a	A
	T _C = 70 °C		12 ^a	16 ^a	
	T _A = 25 °C		9.4 ^{b, c}	14 ^{b, c}	
	T _A = 70 °C		7.5 ^{b, c}	11.2 ^{b, c}	
Pulsed Drain Current		I _{DM}	30	40	
Source Drain Current Diode Current	T _C = 25 °C	I _S	12 ^a	16 ^a	
	T _A = 25 °C		3.1 ^{b, c}	3.7 ^{b, c}	
Single Pulse Avalanche Current	L = 0.1 mH	I _{AS}	10	15	mJ
Single Pulse Avalanche Energy		E _{AS}	5	11	
Maximum Power Dissipation	T _C = 25 °C	P _D	20	30	W
	T _C = 70 °C		12.9	19	
	T _A = 25 °C		3.7 ^{b, c}	4.5 ^{b, c}	
	T _A = 70 °C		2.4 ^{b, c}	2.9 ^{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

Parameter		Symbol	Channel-1		Channel-2		Unit
			Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^{b, f}	$t \leq 10$ s	R_{thJA}	26	34	21	28	$^\circ\text{C/W}$
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	4.7	6.2	3.2	4.2	

Notes:

a. Package limited.

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

c. $t = 10$ s.

d. See Solder Profile (www.vishay.com/ppg?73257). The PowerPAIR 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.

e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

f. Maximum under Steady State conditions is 72°C/W for Channel-1 and 67°C/W for Channel-2.

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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 μA	Ch-1	30			V	
		V _{GS} = 0 V, I _D = 250 μA	Ch-2	30				
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	Ch-1		35		mV/°C	
		I _D = 250 μA	Ch-2		33			
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	Ch-1		- 4.5			
		I _D = 250 μA	Ch-2		- 5			
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	Ch-1	1		2.5	V	
		V _{DS} = V _{GS} , I _D = 250 μA	Ch-2	1.2		2.5		
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	Ch-1			± 100	nA	
			Ch-2			± 100		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V	Ch-1			1	μA	
		V _{DS} = 30 V, V _{GS} = 0 V	Ch-2			1		
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C	Ch-1			5		
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C	Ch-2			5		
On-State Drain Current ^b	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	Ch-1	20			A	
		V _{DS} ≥ 5 V, V _{GS} = 10 V	Ch-2	20				
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 7.8 A	Ch-1		0.020	0.024	Ω	
		V _{GS} = 10 V, I _D = 10 A	Ch-2		0.0105	0.0135		
		V _{GS} = 4.5 V, I _D = 7 A	Ch-1		0.024	0.030		
		V _{GS} = 4.5 V, I _D = 7 A	Ch-2		0.0135	0.017		
Forward Transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 7.8 A	Ch-1		17		S	
		V _{DS} = 10 V, I _D = 10 A	Ch-2		24			
Dynamic ^a								
Input Capacitance	C _{iss}	Channel-1 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1		435		pF	
			Ch-2		846			
Output Capacitance	C _{oss}	Channel-2 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1		95			
			Ch-2		187			
Reverse Transfer Capacitance	C _{rss}		Ch-1		42			
			Ch-2		72			
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 7.8 A	Ch-1		8	12	nC	
		V _{DS} = 15 V, V _{GS} = 10 V, I _D = 10 A	Ch-2		15.4	23		
		Channel-1 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 7.8 A	Ch-1		3.8	6		
			Ch-2		7.3	11		
Gate-Source Charge	Q _{gs}	Channel-2 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 10 A	Ch-1		1.4			
			Ch-2		2.3			
Gate-Drain Charge	Q _{gd}		Ch-1		1.1			
			Ch-2		2.2			
Gate Resistance	R _g	f = 1 MHz	Ch-1	0.6	3.2	6.4	Ω	
			Ch-2	0.2	0.8	1.6		

Notes:

a. Guaranteed by design, not subject to production testing.

b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.



SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Dynamic ^a							
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 15\text{ V}$, $R_L = 2.4\text{ }\Omega$ $I_D \cong 6.3\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$	Ch-1		15	30	ns
			Ch-2		15	30	
Rise Time	t_r		Ch-1		12	24	
			Ch-2		12	24	
Turn-Off Delay Time	$t_{d(off)}$	Ch-1		13	26		
		Ch-2		13	26		
Fall Time	t_f	Ch-1		10	20		
		Ch-2		10	20		
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 15\text{ V}$, $R_L = 2.4\text{ }\Omega$ $I_D \cong 6.3\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$	Ch-1		5	10	
			Ch-2		9	18	
Rise Time	t_r		Ch-1		10	20	
			Ch-2		9	18	
Turn-Off Delay Time	$t_{d(off)}$	Ch-1		15	30		
		Ch-2		14	28		
Fall Time	t_f	Ch-1		10	20		
		Ch-2		8	16		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$	Ch-1			12	A
			Ch-2			16	
Pulse Diode Forward Current ^a	I_{SM}		Ch-1			30	
			Ch-2			40	
Body Diode Voltage	V_{SD}	$I_S = 6.3\text{ A}$, $V_{GS} = 0\text{ V}$	Ch-1		0.8	1.2	V
		$I_S = 3\text{ A}$, $V_{GS} = 0\text{ V}$	Ch-2		0.78	1.2	
Body Diode Reverse Recovery Time	t_{rr}	Channel-1 $I_F = 6.3\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$ Channel-2 $I_F = 10\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$	Ch-1		15	30	ns
			Ch-2		17	34	
Body Diode Reverse Recovery Charge	Q_{rr}		Ch-1		7	15	nC
			Ch-2		9.5	19	
Reverse Recovery Fall Time	t_a		Ch-1		9		ns
			Ch-2		10		
Reverse Recovery Rise Time	t_b		Ch-1		6		
			Ch-2		7		

Notes:

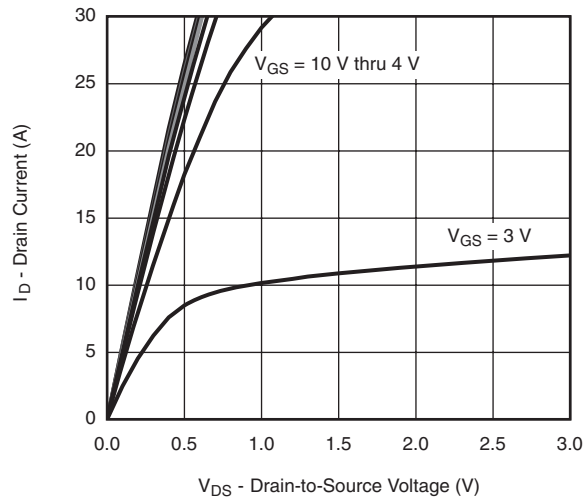
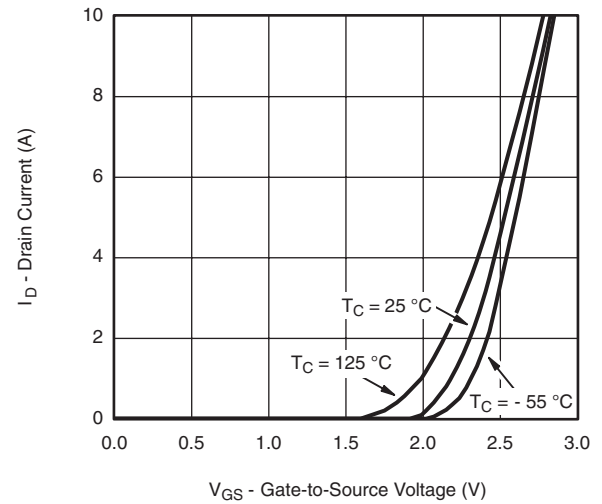
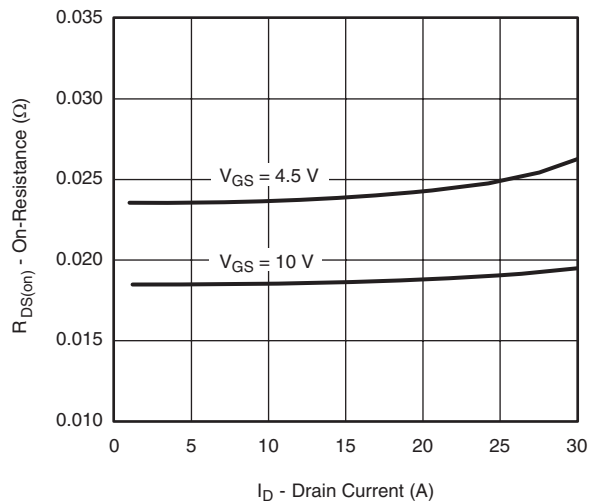
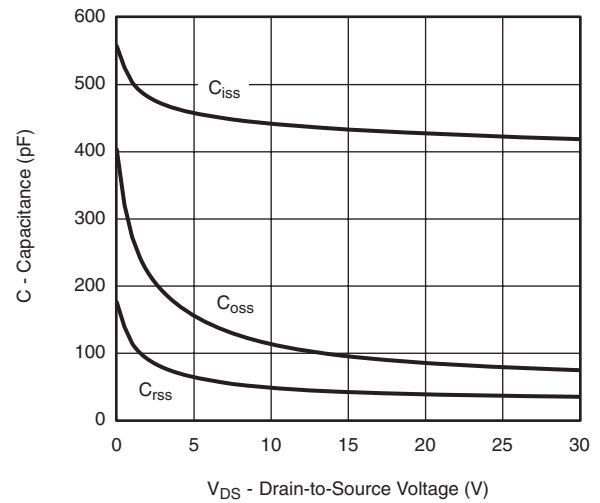
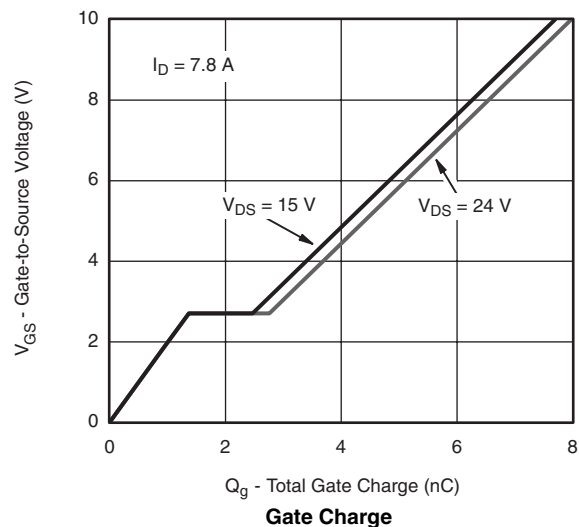
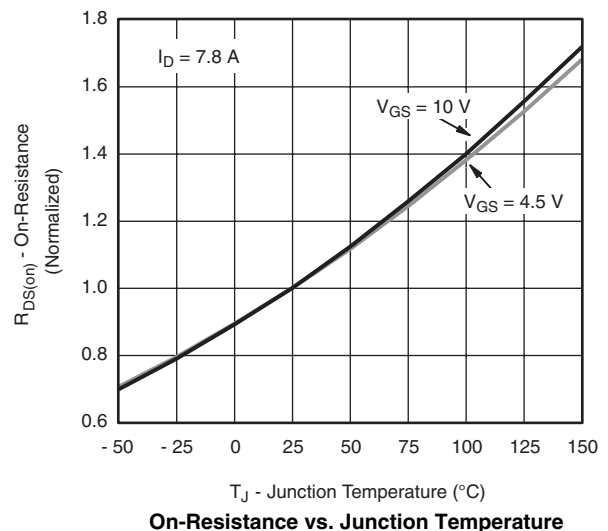
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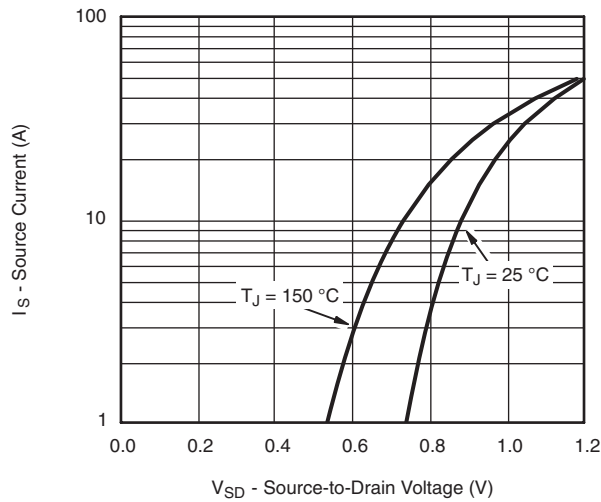
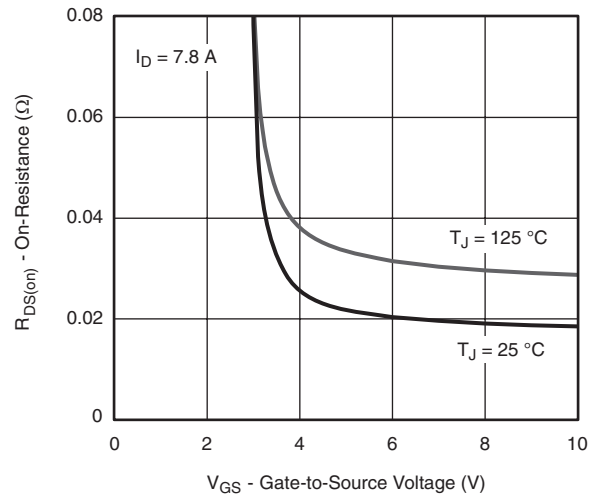
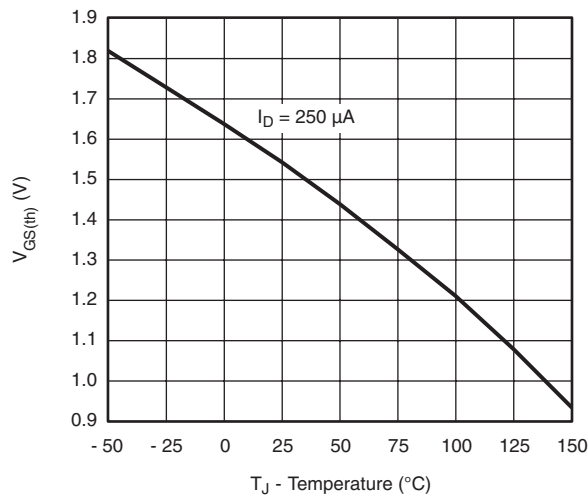
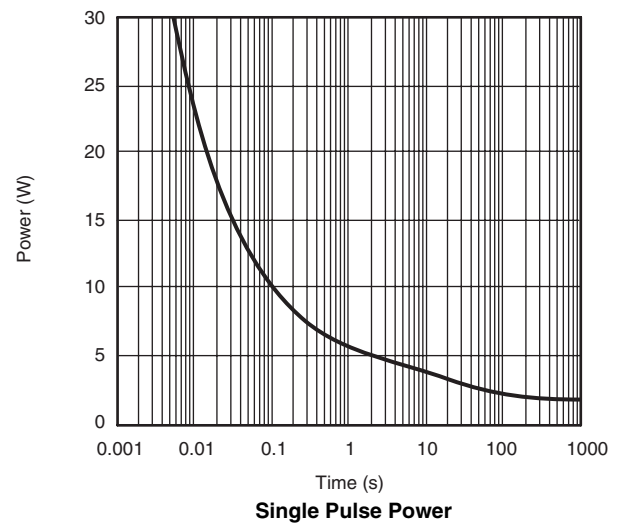
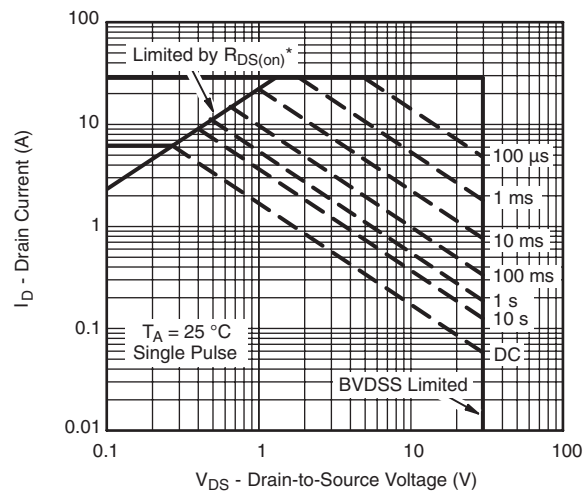
b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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.

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**CHANNEL-1 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

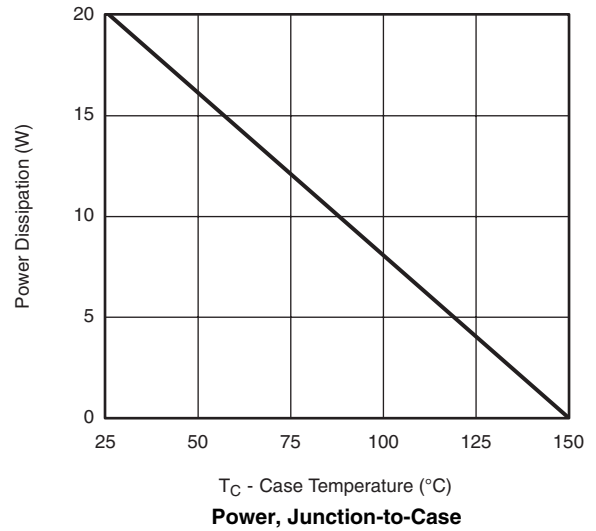
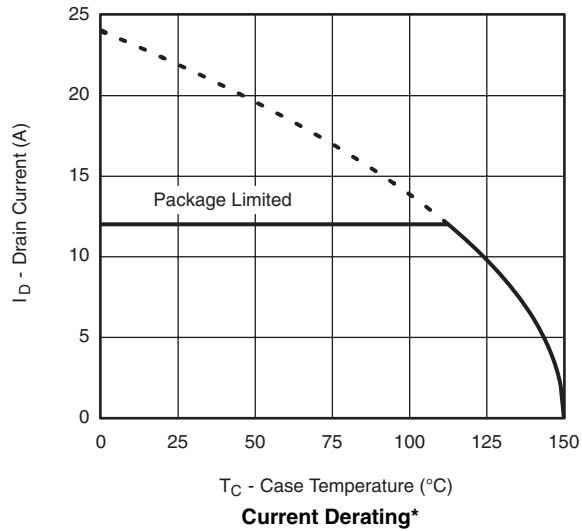

CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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

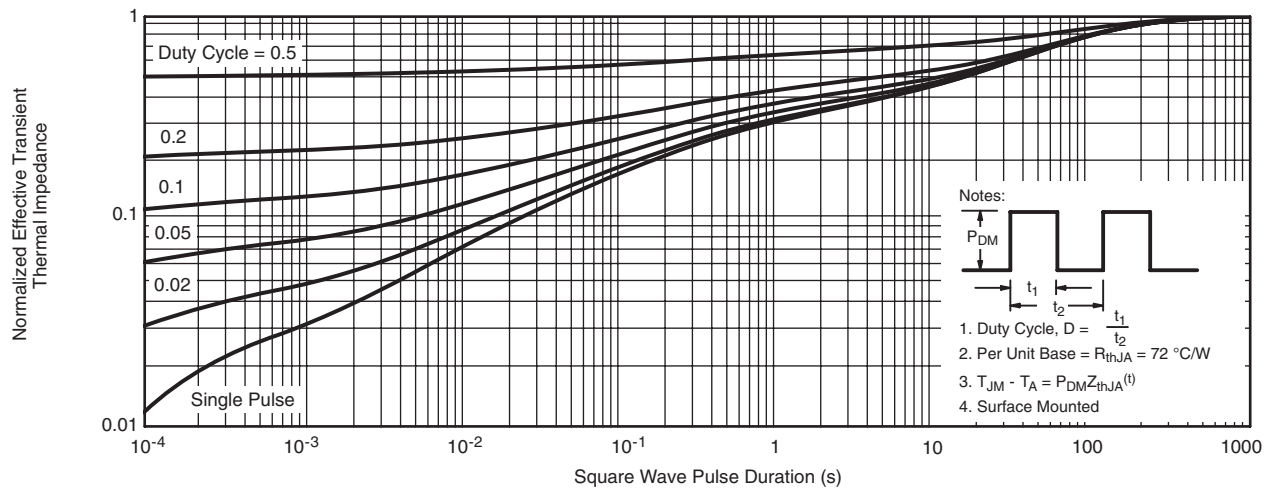
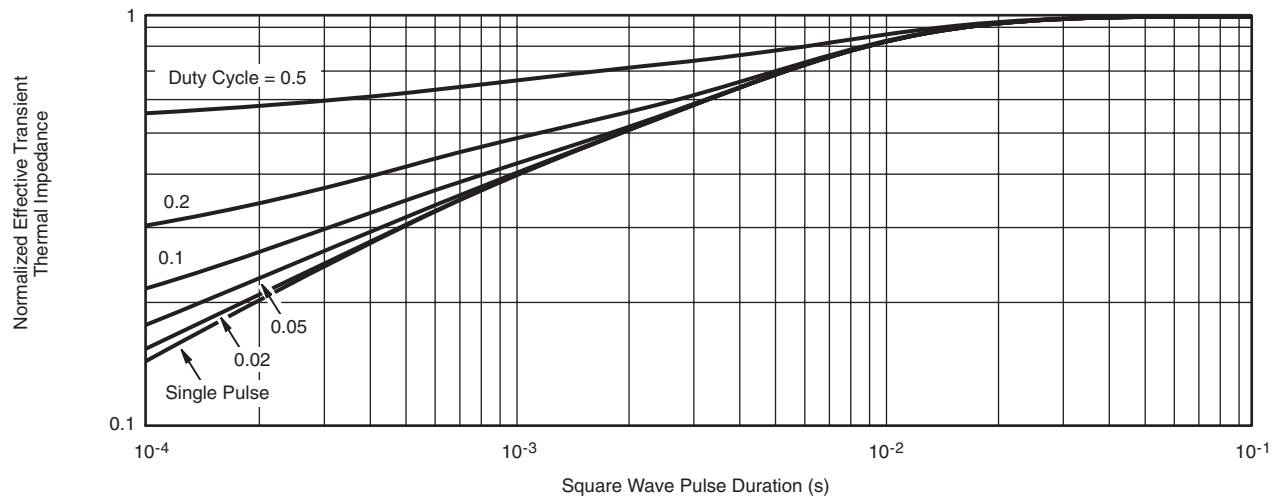
Safe Operating Area, Junction-to-Ambient

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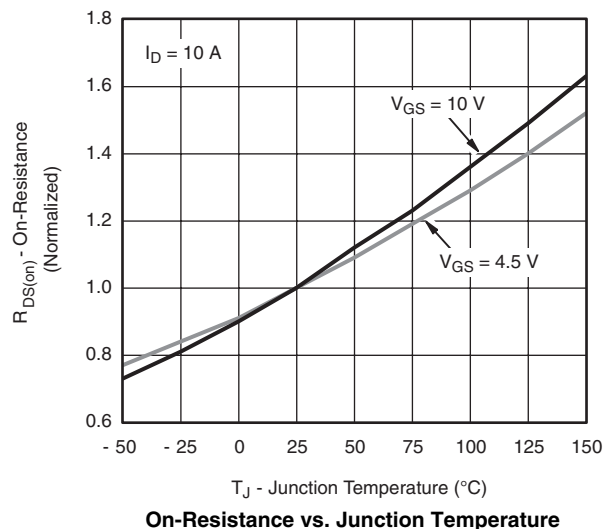
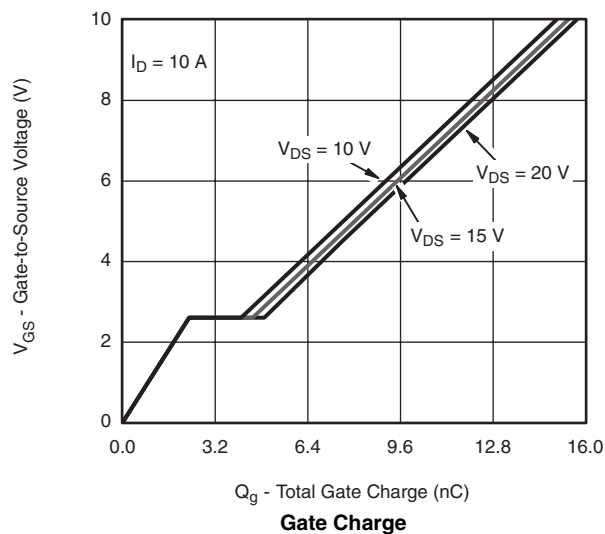
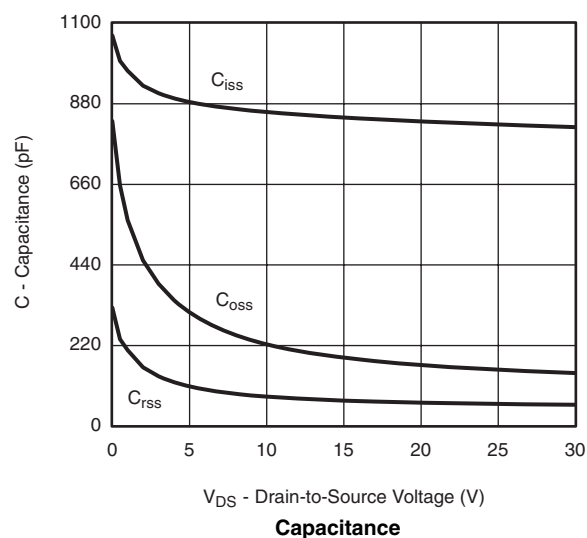
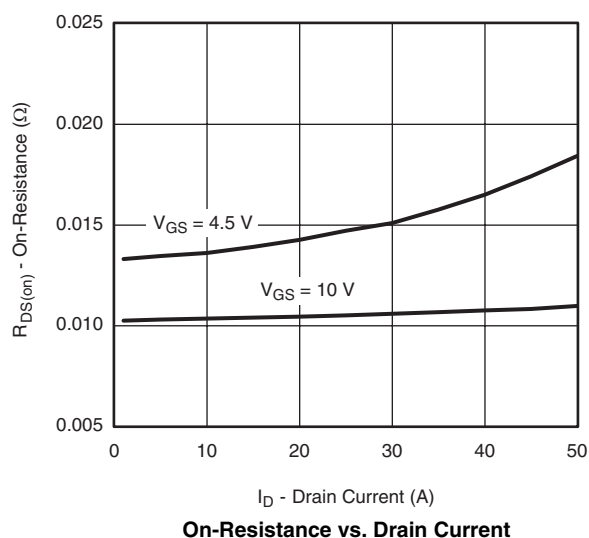
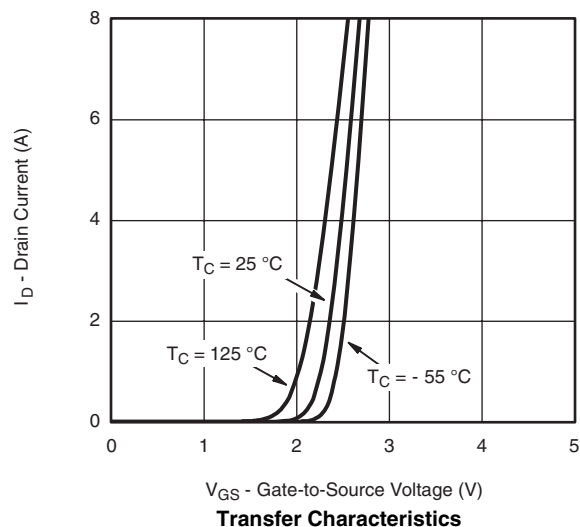
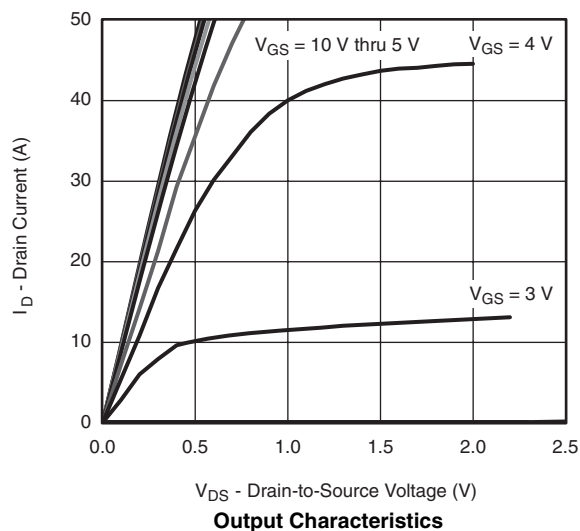
**CHANNEL-1 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

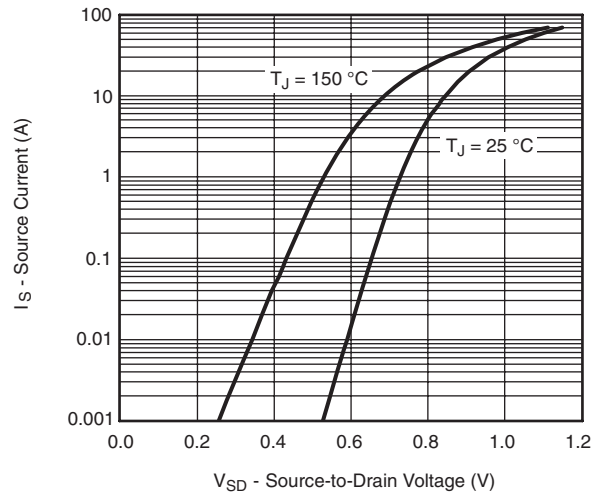
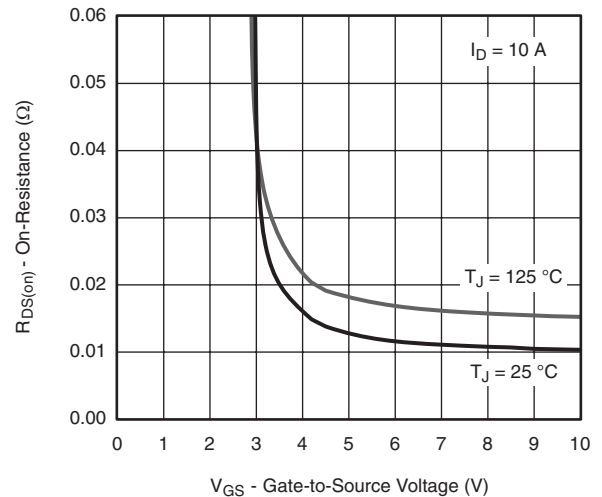
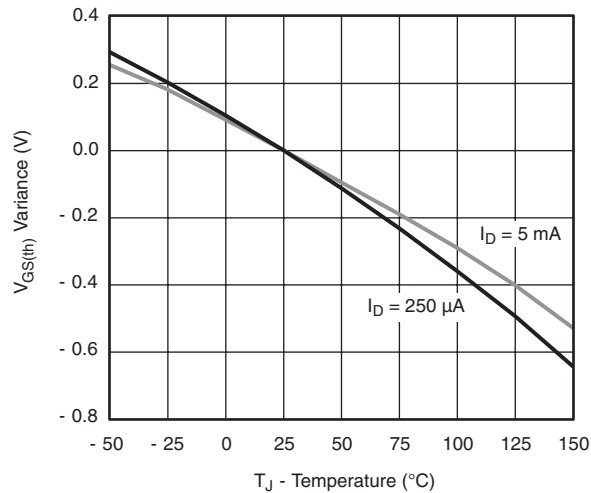
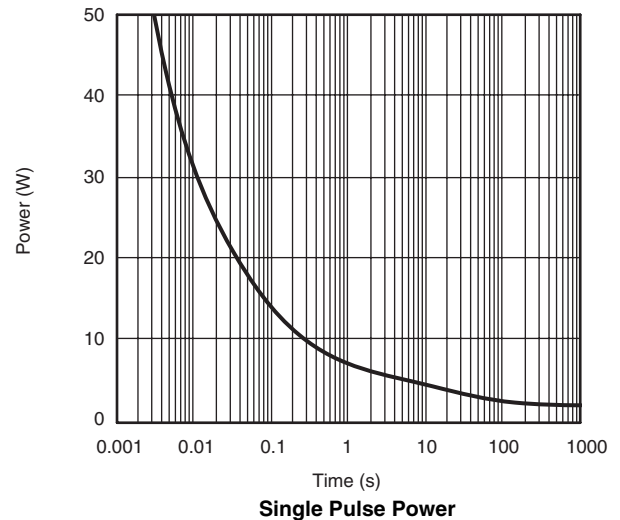
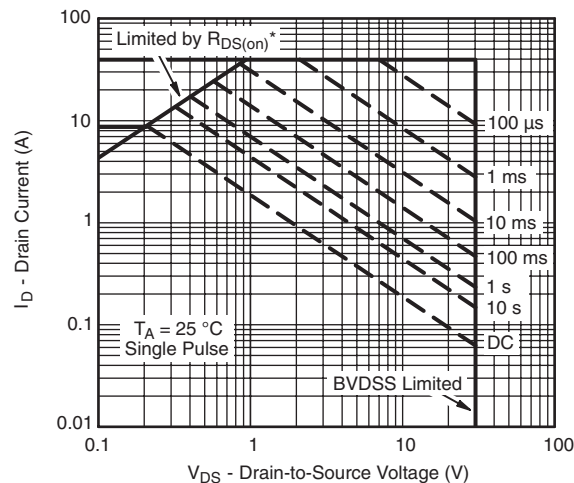
* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.


CHANNEL-1 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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**CHANNEL-2 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

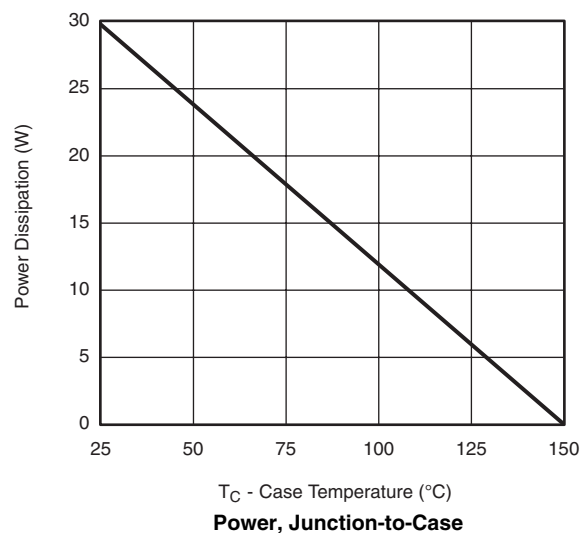
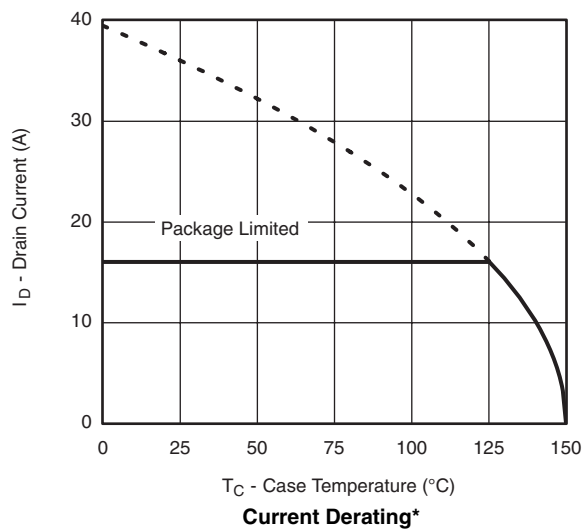

CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source

Threshold Voltage

Single Pulse Power


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

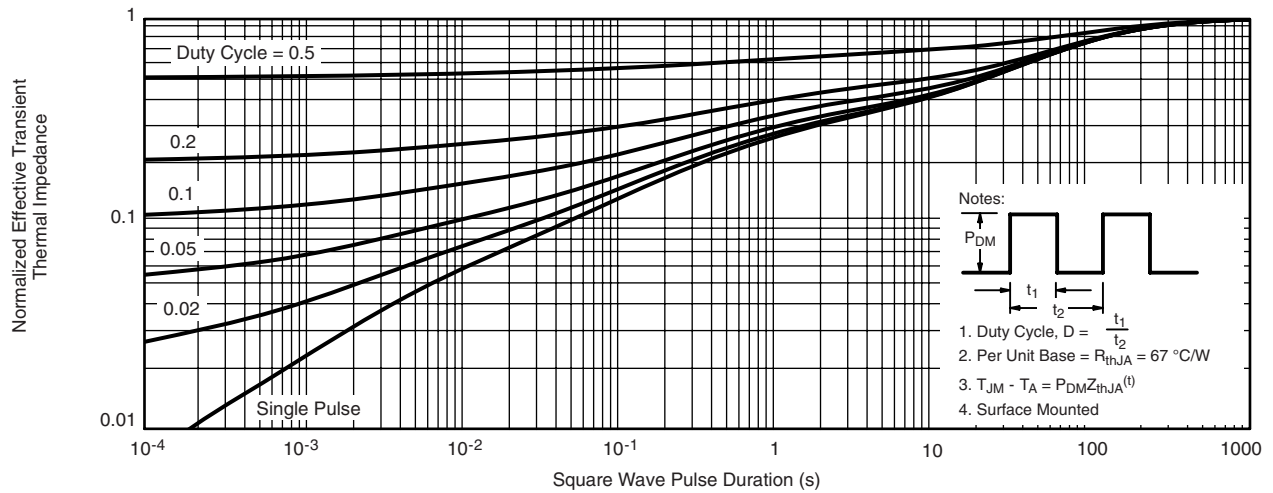
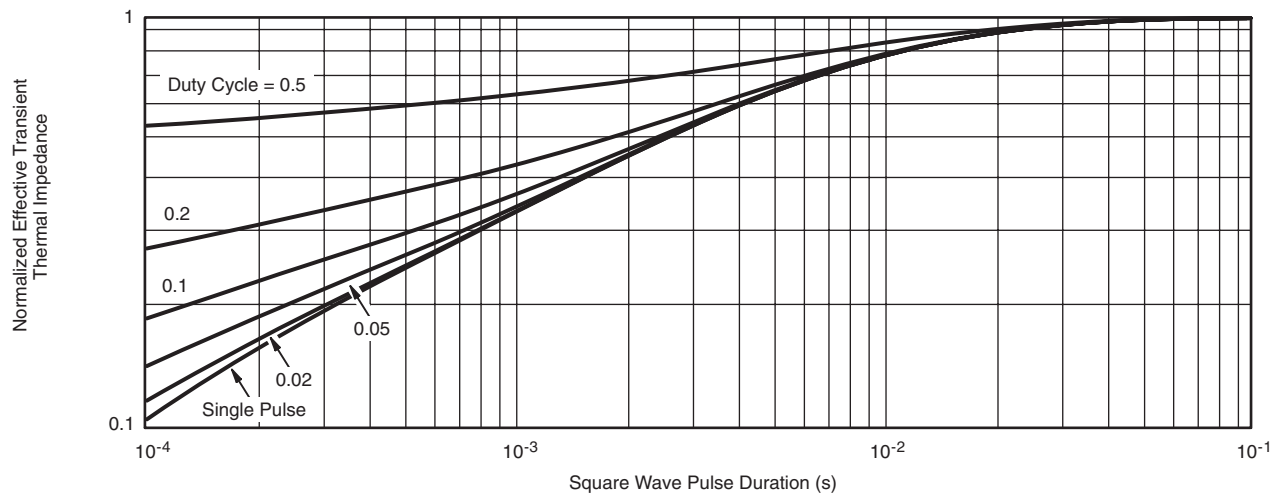
Safe Operating Area, Junction-to-Ambient

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**CHANNEL-2 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.


CHANNEL-2 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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