

N- and P-Channel 60-V (D-S), 175 °C MOSFET

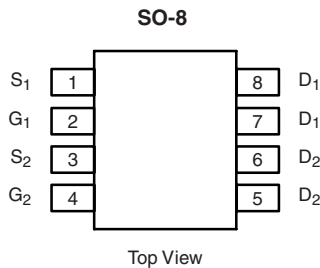
PRODUCT SUMMARY			
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
N-Channel	60	0.055 at V _{GS} = 10 V	± 4.5
		0.075 at V _{GS} = 4.5 V	± 3.9
P-Channel	- 60	0.120 at V _{GS} = - 10 V	± 3.1
		0.150 at V _{GS} = - 4.5 V	± 2.8

FEATURES

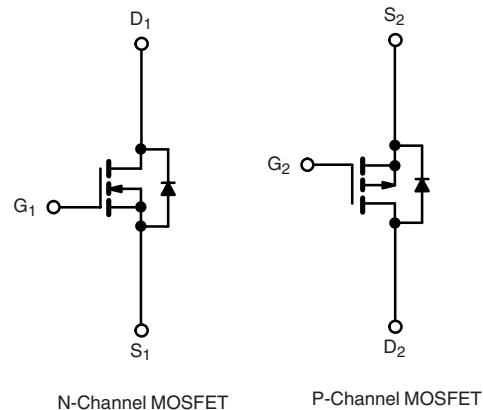
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available



Ordering Information: Si4559EY-T1-E3 (Lead (Pb)-free)
Si4559EY-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}	60	- 60	V
Gate-Source Voltage	V _{GS}	± 20	± 20	
Continuous Drain Current (T _J = 175 °C) ^a	I _D	T _A = 25 °C	± 4.5	A
		T _A = 70 °C	± 3.8	
Pulsed Drain Current	I _{DM}	± 30	± 30	
Continuous Source Current (Diode Conduction) ^a	I _S	2.0	- 2.0	
Maximum Power Dissipation ^a	P _D	2.4		W
		1.7		
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 175		°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	N- or P-Channel	Unit
Maximum Junction-to-Ambient ^a	R _{thJA}	62.5	°C/W

Notes:

a. Surface Mounted on FR4 board, t ≤ 10 s.

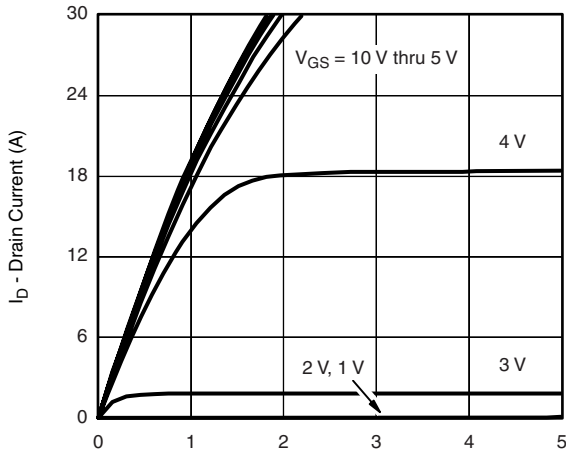
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	N-Ch	1		V
		$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	P-Ch	-1		
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	N-Ch		± 100	nA
			P-Ch		± 100	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$	N-Ch		2	μA
			P-Ch		-2	
			N-Ch		25	
			P-Ch		-25	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	N-Ch	20		A
		$V_{DS} \leq -5\text{ V}, V_{GS} = -10\text{ V}$	P-Ch	-20		
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 4.5\text{ A}$	N-Ch	0.045	0.055	Ω
			P-Ch	0.100	0.120	
			N-Ch	0.055	0.075	
			P-Ch	0.125	0.150	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 4.5\text{ A}$	N-Ch	13		S
			P-Ch	7.5		
Diode Forward Voltage ^b	V_{SD}	$I_S = 2.0\text{ A}, V_{GS} = 0\text{ V}$	N-Ch	0.9	1.2	V
		$I_S = -2.0\text{ A}, V_{GS} = 0\text{ V}$	P-Ch	-0.8	-1.2	
Dynamic^a						
Total Gate Charge	Q_g	N-Channel $V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 4.5\text{ A}$	N-Ch	19	30	nC
			P-Ch	16	25	
Gate-Source Charge	Q_{gs}	P-Channel $V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}$ $I_D = -3.1\text{ A}$	N-Ch	4		nC
			P-Ch	4		
Gate-Drain Charge	Q_{gd}		N-Ch	3		nC
			P-Ch	1.6		
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 30\text{ V}, R_L = 30\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$	N-Ch	13	20	ns
			P-Ch	8	15	
Rise Time	t_r		N-Ch	11	20	ns
			P-Ch	10	20	
Turn-Off Delay Time	$t_{d(off)}$	P-Channel $V_{DD} = -30\text{ V}, R_L = 30\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -10\text{ V}, R_g = 6\text{ }\Omega$	N-Ch	36	60	ns
			P-Ch	12	25	
Fall Time	t_f		N-Ch	11	20	ns
			P-Ch	35	50	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 2\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$	N-Ch	35	60	ns
		$I_F = -2\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$	P-Ch	60	90	

Notes:

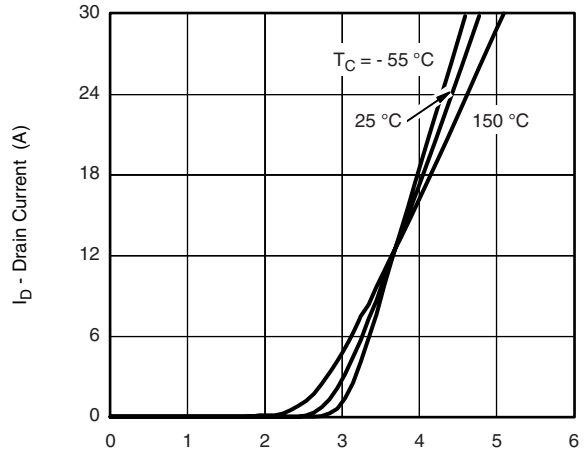
- a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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.

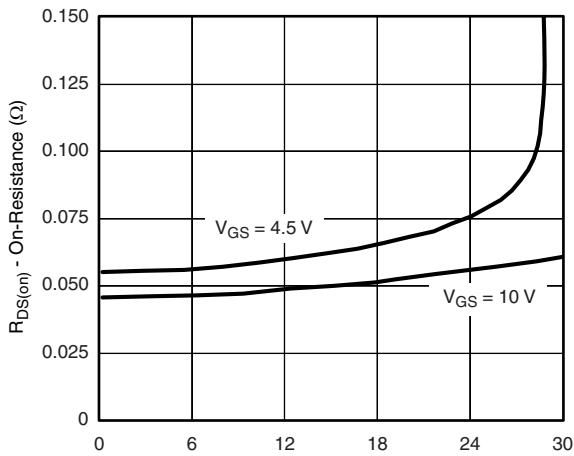
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



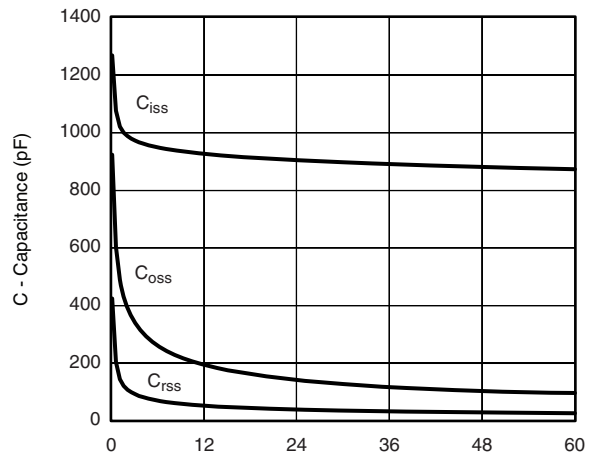
V_{DS} - Drain-to-Source Voltage (V)
Output Characteristics



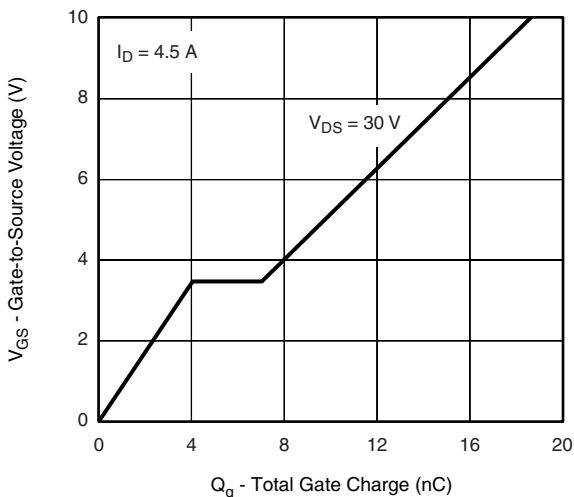
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



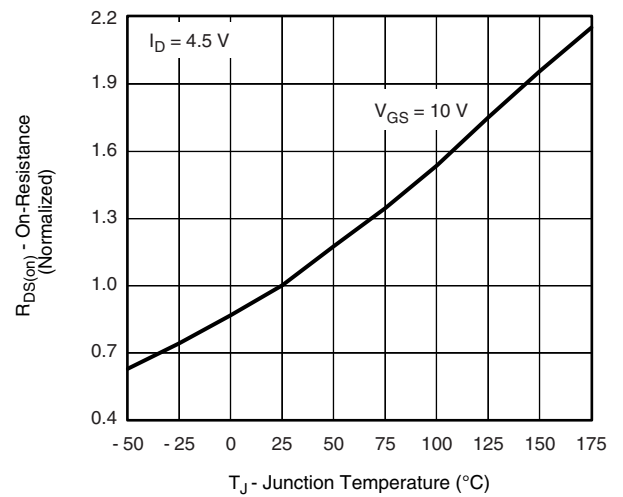
I_D - Drain Current (A)
On-Resistance vs. Drain Current



V_{DS} - Drain-to-Source Voltage (V)
Capacitance

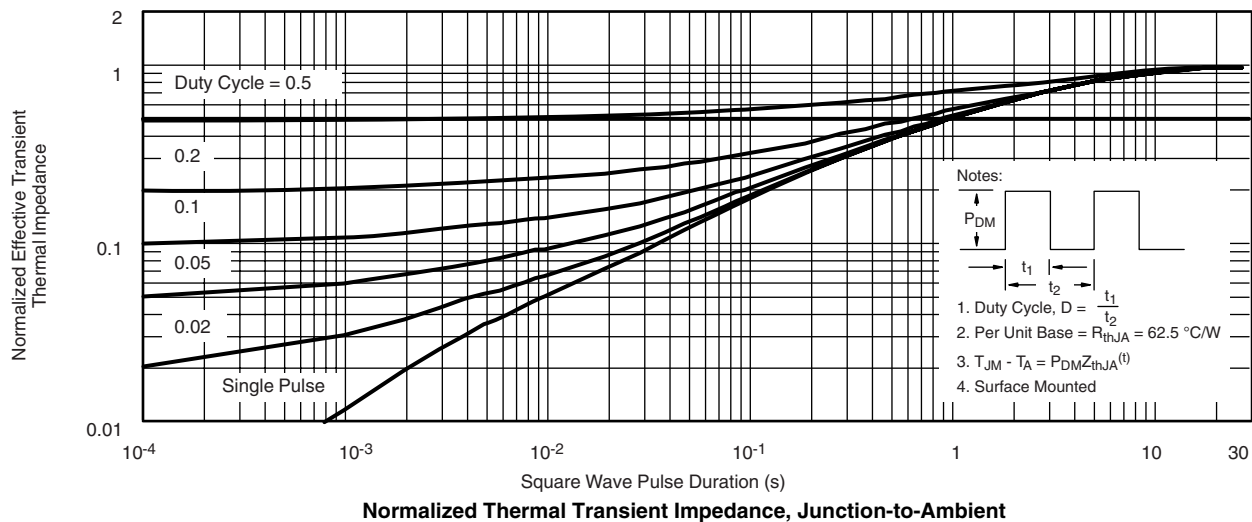
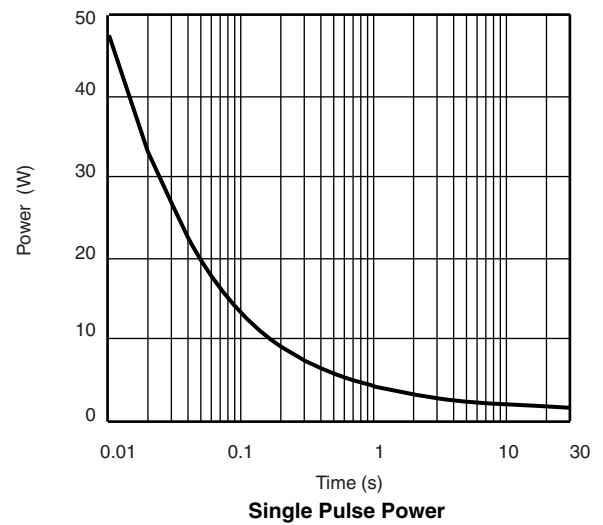
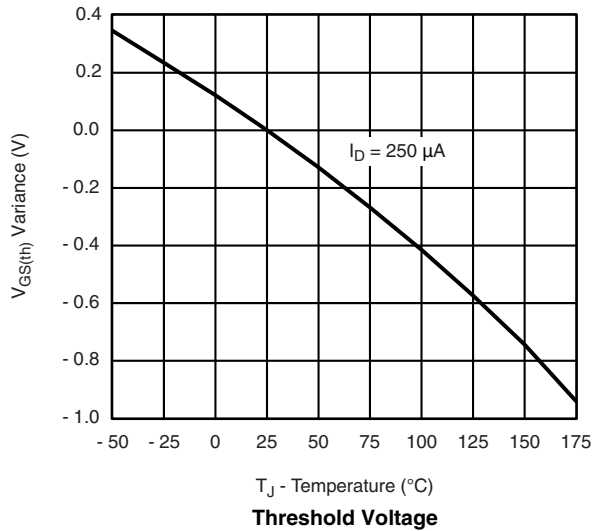
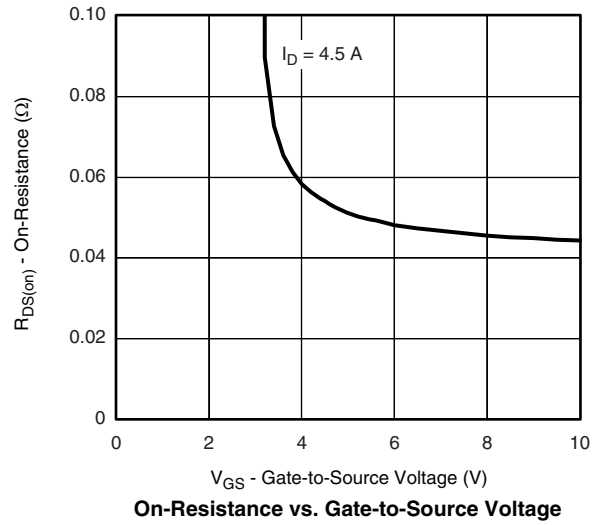
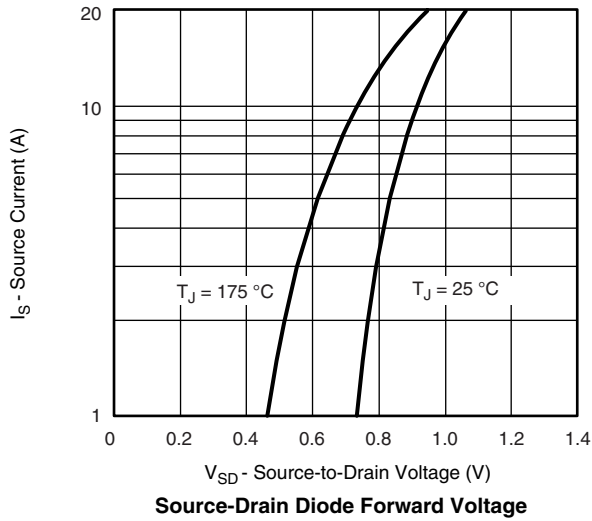


Q_g - Total Gate Charge (nC)
Gate Charge

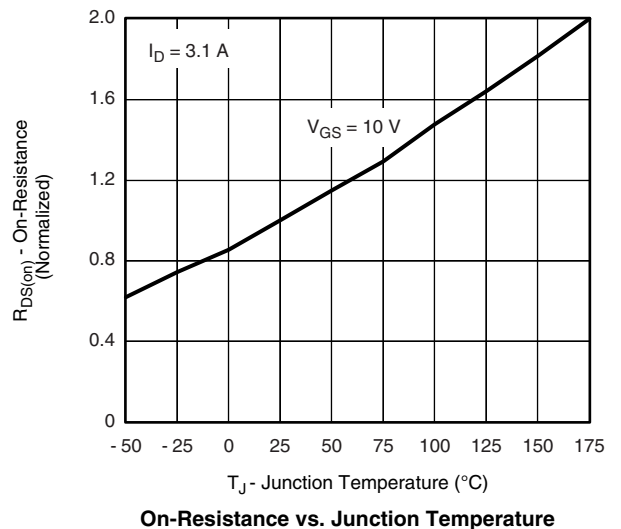
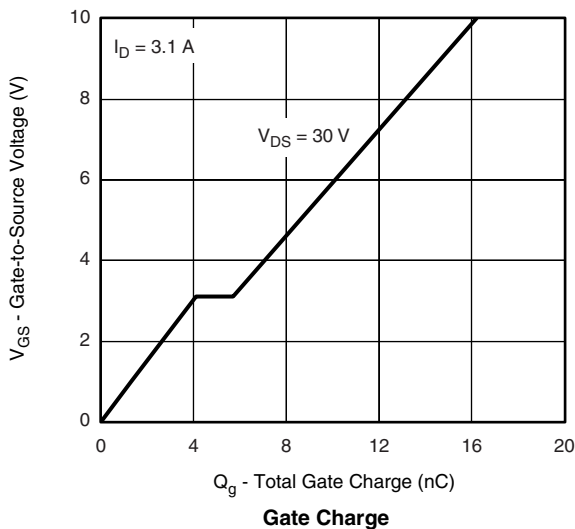
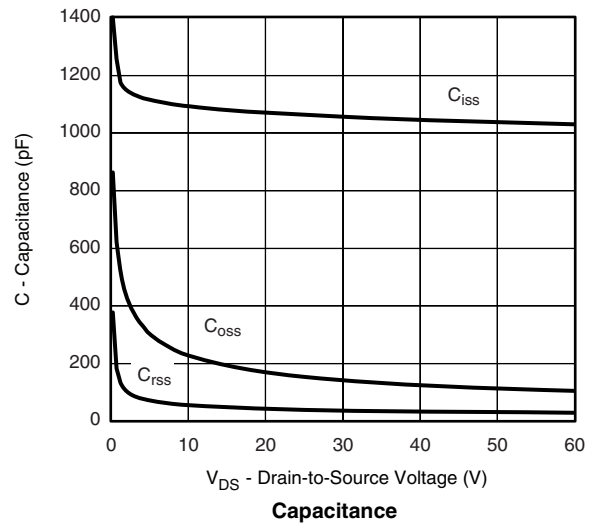
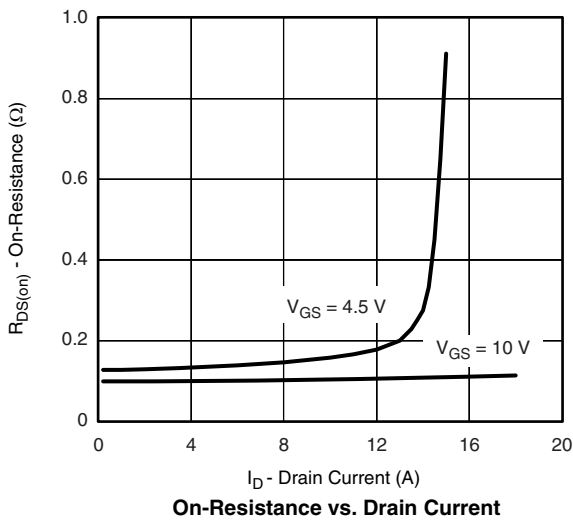
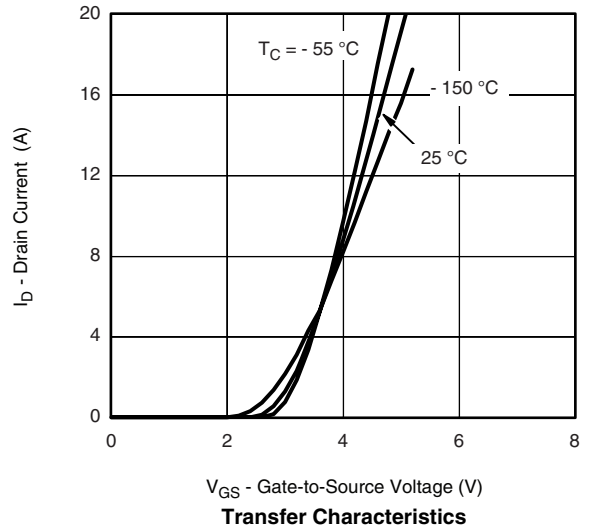
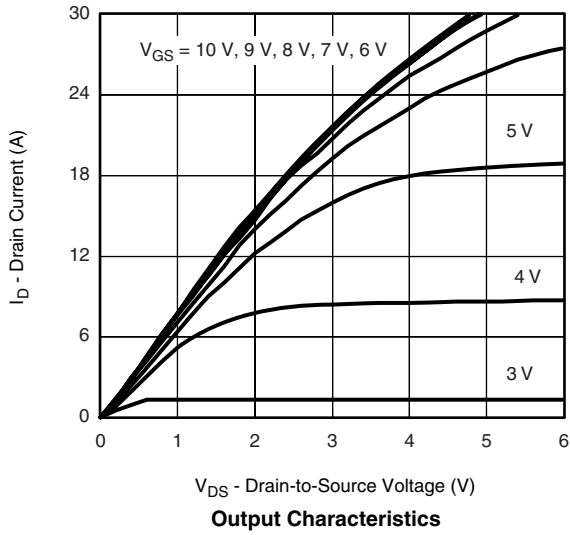


T_J - Junction Temperature ($^\circ\text{C}$)
On-Resistance vs. Junction Temperature

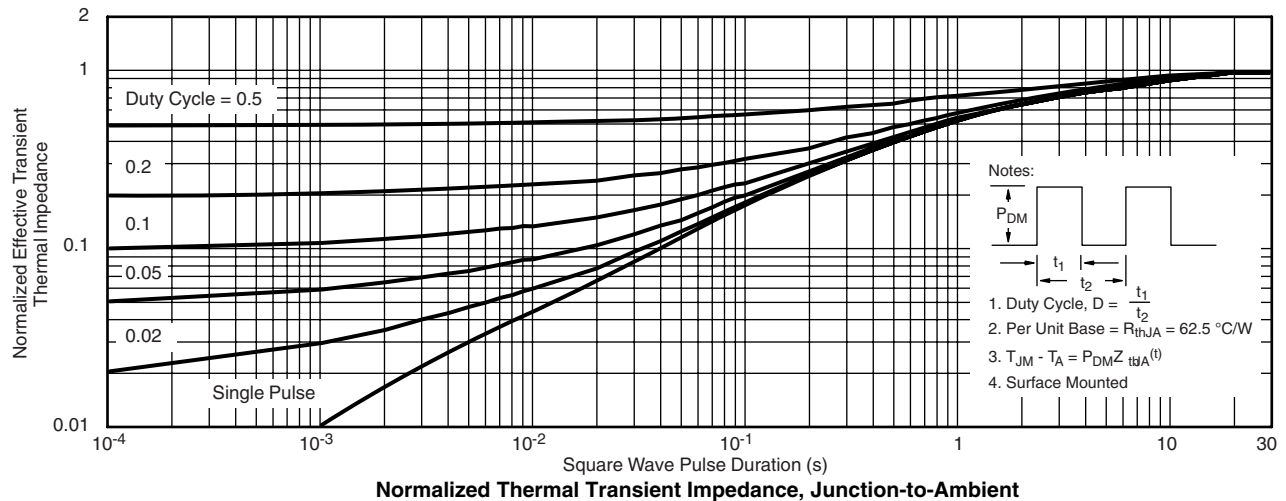
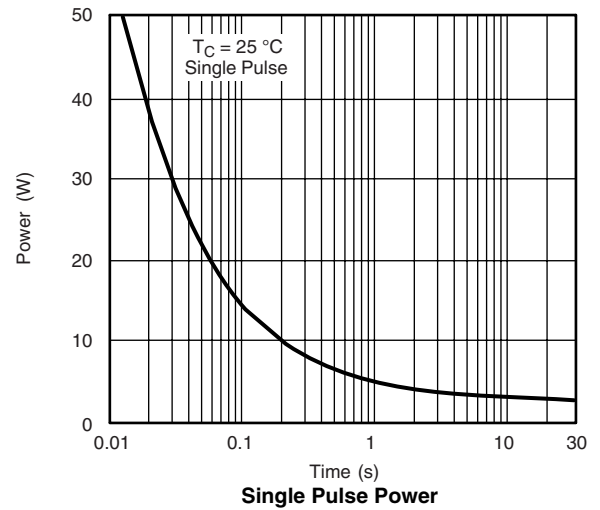
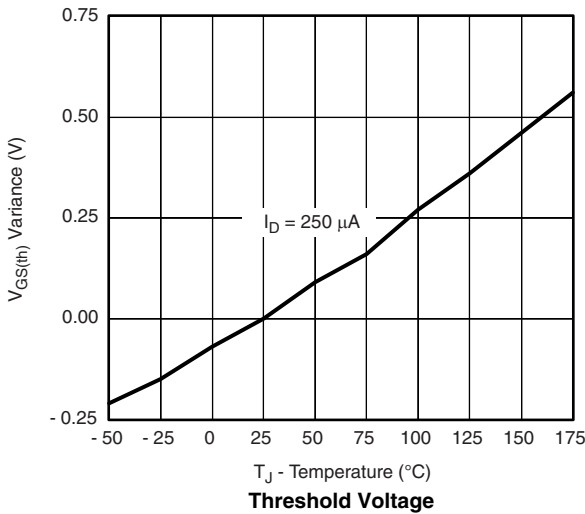
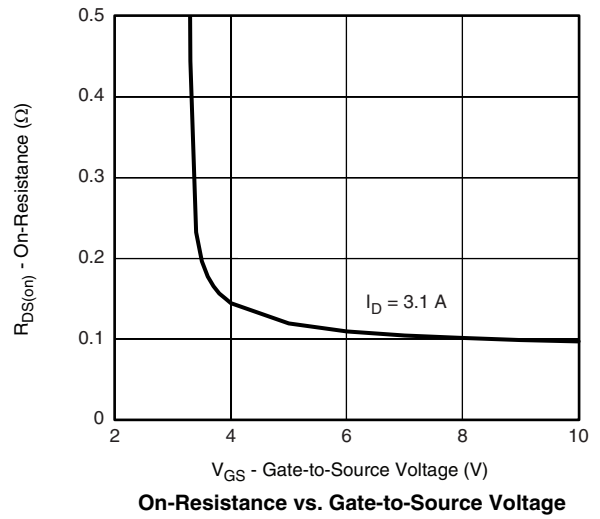
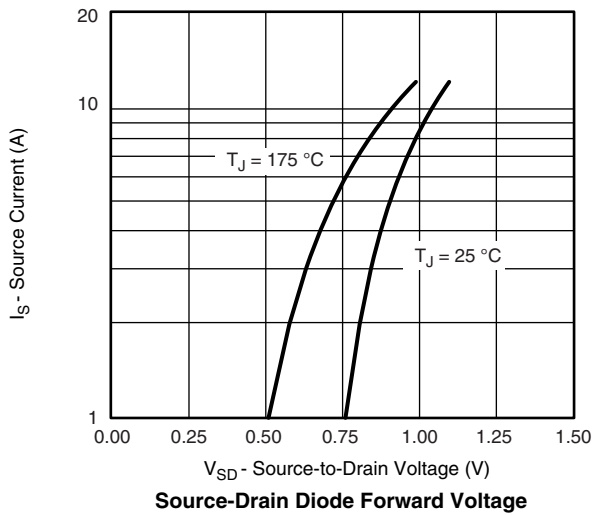
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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



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



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