

## N- and P-Channel 30-V (D-S) MOSFET

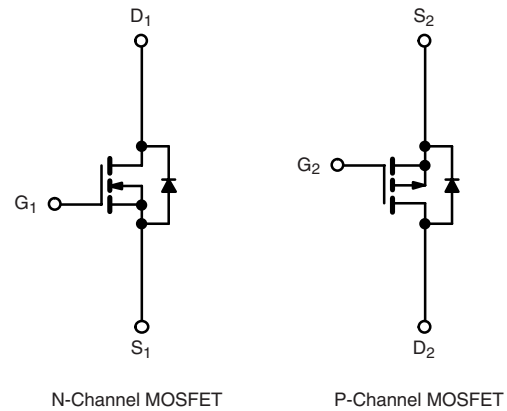
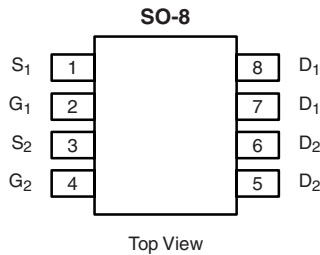
PRODUCT SUMMARY			
	V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
N-Channel	30	0.025 at V <sub>GS</sub> = 10 V	6.9
		0.035 at V <sub>GS</sub> = 4.5 V	5.8
P-Channel	- 30	0.032 at V <sub>GS</sub> = - 10 V	- 6.1
		0.045 at V <sub>GS</sub> = - 4.5 V	- 5.1

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R<sub>g</sub> Tested
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available



**Ordering Information:** Si4542DY-T1-E3 (Lead (Pb)-free)  
Si4542DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted				
Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	- 30	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 6.1	A
		T <sub>A</sub> = 70 °C	- 4.9	
Pulsed Drain Current	I <sub>DM</sub>	40	- 40	
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	1.7	- 1.7	
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	2.0		W
		1.3		
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	N- or P-Channel	Unit
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	62.5	°C/W

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

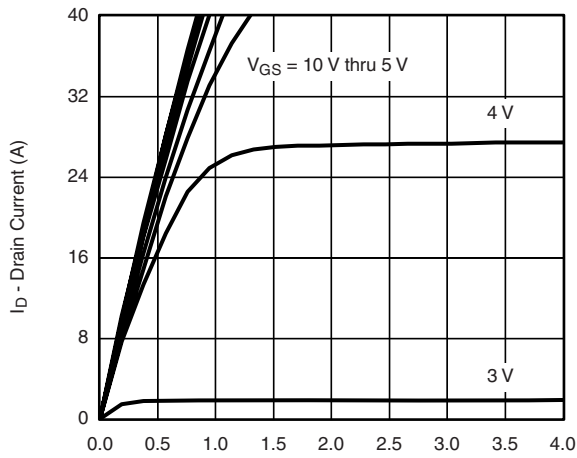
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Static</b>							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	N-Ch	1.0			V
		$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	P-Ch	-1.0			
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	N-Ch P-Ch			$\pm 100$ $\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	N-Ch			1	$\mu\text{A}$
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$	P-Ch			-1	
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	N-Ch			25	
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	P-Ch			-25	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	N-Ch	20			A
		$V_{DS} \leq -5\text{ V}, V_{GS} = -10\text{ V}$	P-Ch	-20			
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 6.9\text{ A}$	N-Ch		0.020	0.025	$\Omega$
		$V_{GS} = -10\text{ V}, I_D = -6.1\text{ A}$	P-Ch		0.026	0.032	
		$V_{GS} = 4.5\text{ V}, I_D = 5.8\text{ A}$	N-Ch		0.026	0.035	
		$V_{GS} = -4.5\text{ V}, I_D = -5.1\text{ A}$	P-Ch		0.036	0.045	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 6.9\text{ A}$	N-Ch		25		S
		$V_{DS} = -15\text{ V}, I_D = -6.1\text{ A}$	P-Ch		16		
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 1.7\text{ A}, V_{GS} = 0\text{ V}$	N-Ch			1.2	V
		$I_S = -1.7\text{ A}, V_{GS} = 0\text{ V}$	P-Ch			-1.2	
<b>Dynamic<sup>b</sup></b>							
Total Gate Charge	$Q_g$	N-Channel $V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 6.9\text{ A}$	N-Ch		30	50	nC
Gate-Source Charge	$Q_{gs}$		P-Ch		32	50	
Gate-Drain Charge	$Q_{gd}$	P-Channel $V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -6.1\text{ A}$	N-Ch		7.5		
			P-Ch		7.0		
Gate Resistance	$R_g$		N-Ch	0.5	2	3.4	$\Omega$
			P-Ch	2	4	6.8	
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 15\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$	N-Ch		12	20	ns
Rise Time	$t_r$		P-Ch		10	20	
		Turn-Off Delay Time	$t_{d(off)}$	N-Ch		10	
P-Ch				10	20		
Fall Time	$t_f$	P-Channel $V_{DD} = -15\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -10\text{ V}, R_g = 6\text{ }\Omega$	N-Ch		60	90	
			P-Ch		55	80	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 1.7\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$	N-Ch		50	90	
			P-Ch		50	90	
Reverse Recovery Time	$Q_{rr}$	$I_F = 1.7\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$	N-Ch		45		nC
		$I_F = -1.7\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$	P-Ch		55		

## Notes:

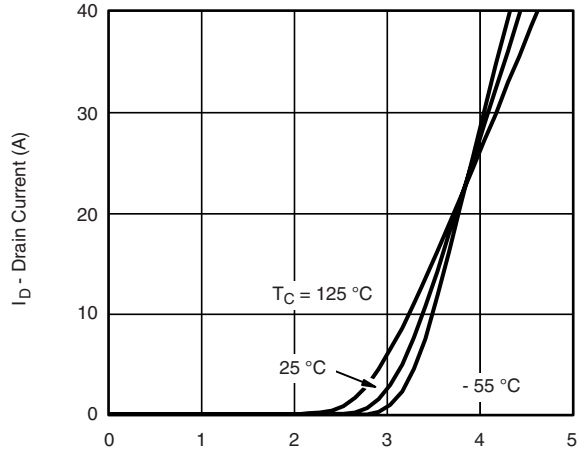
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.

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.

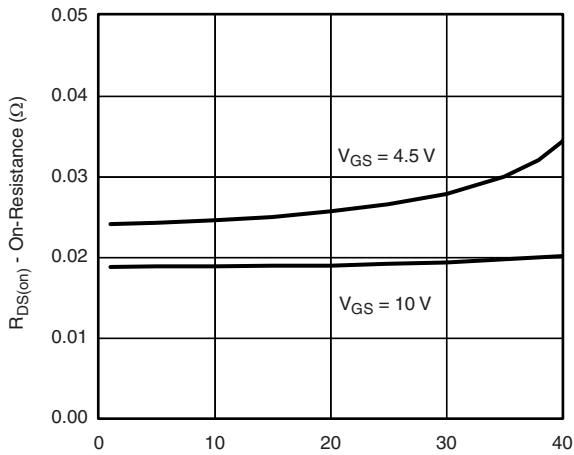
## N-CHANNEL TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



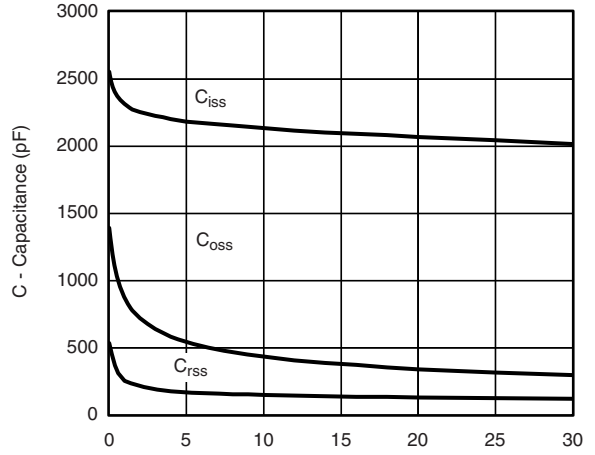
$V_{DS}$  - Drain-to-Source Voltage (V)  
**Output Characteristics**



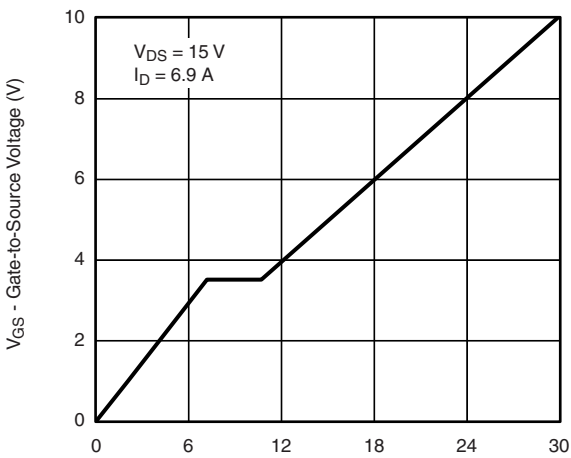
$V_{GS}$  - Gate-to-Source Voltage (V)  
**Transfer Characteristics**



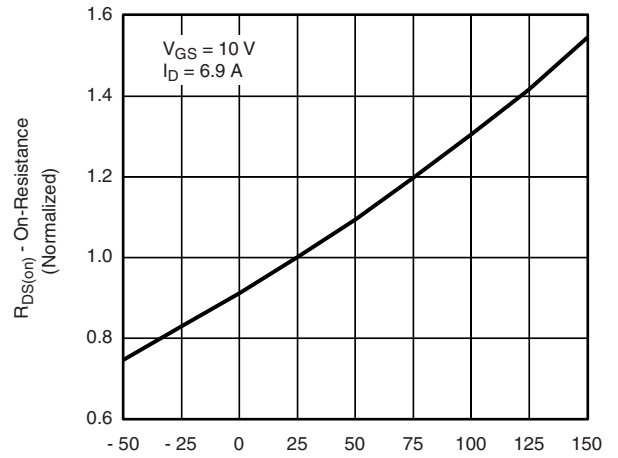
$R_{DS(on)}$  - On-Resistance ( $\Omega$ )  
**On-Resistance vs. Drain Current**



$C$  - Capacitance (pF)  
**Capacitance**

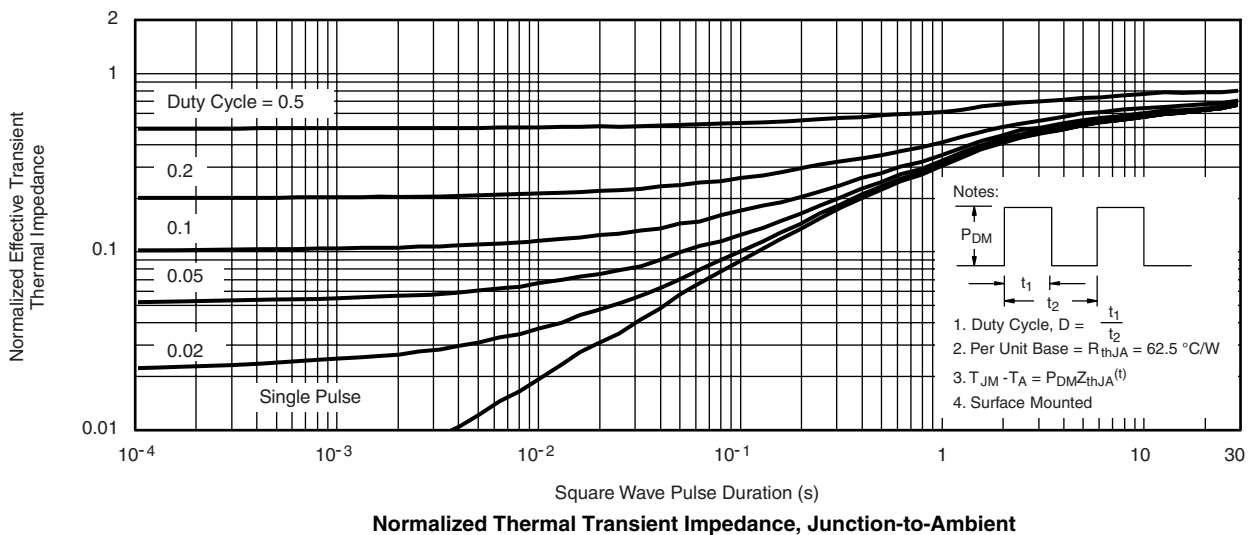
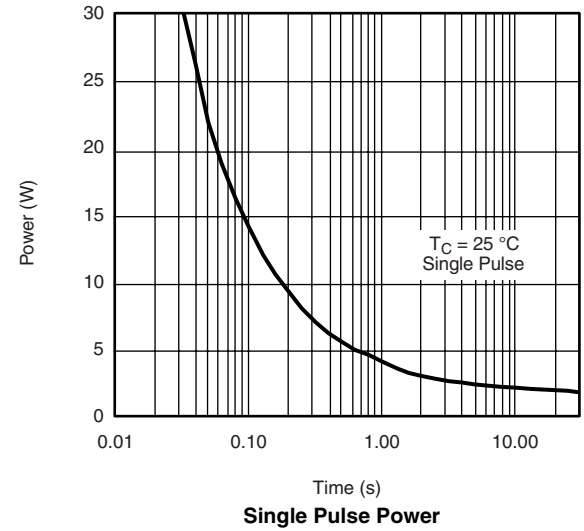
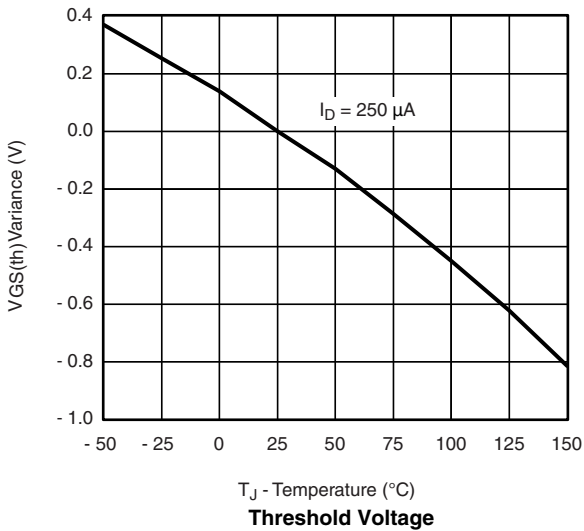
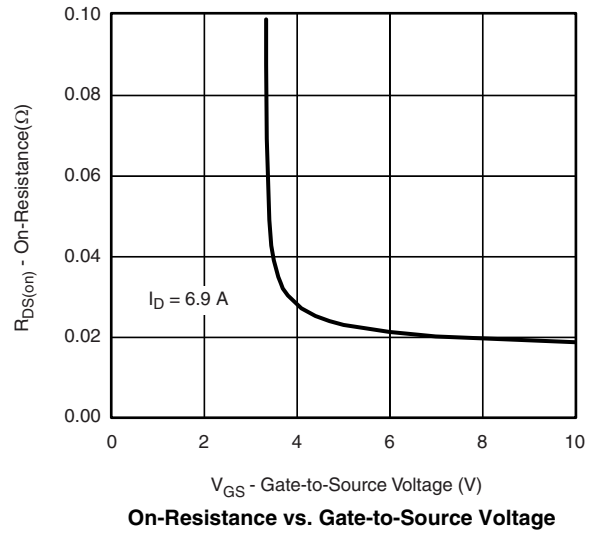
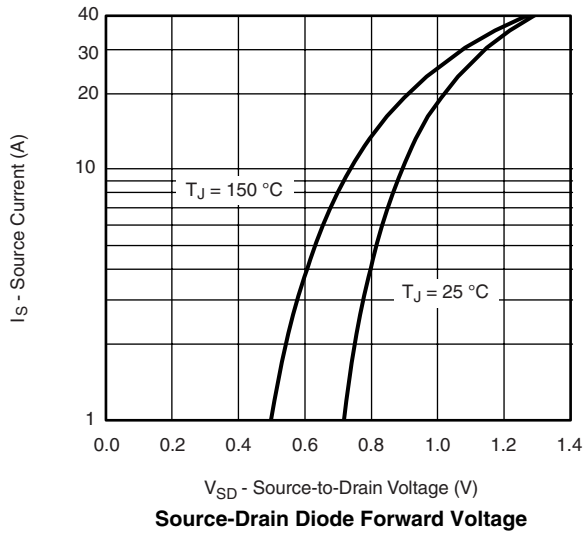


$Q_g$  - Total Gate Charge (nC)  
**Gate Charge**

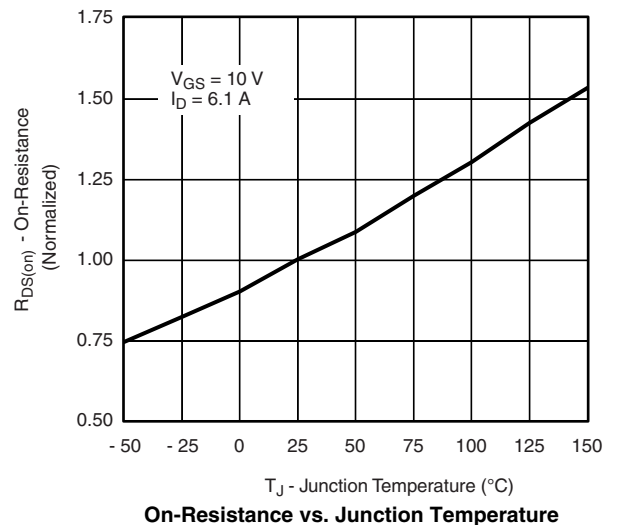
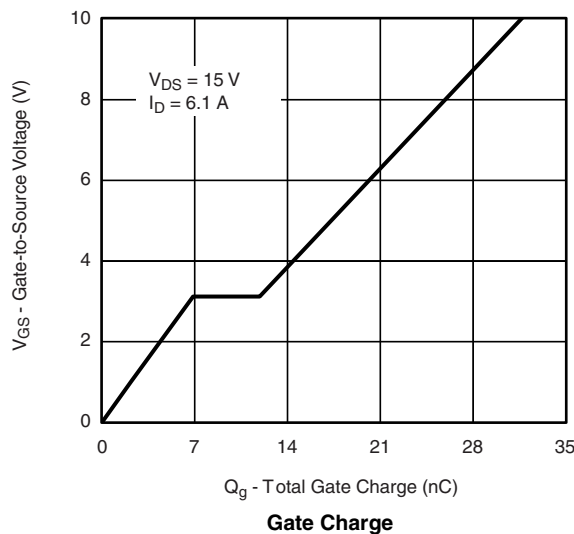
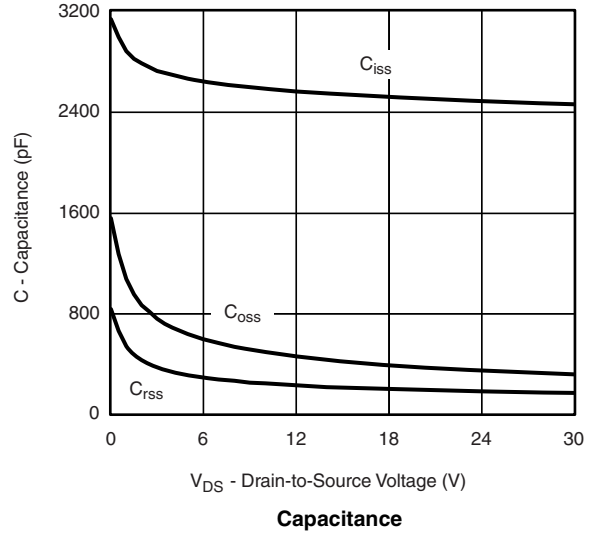
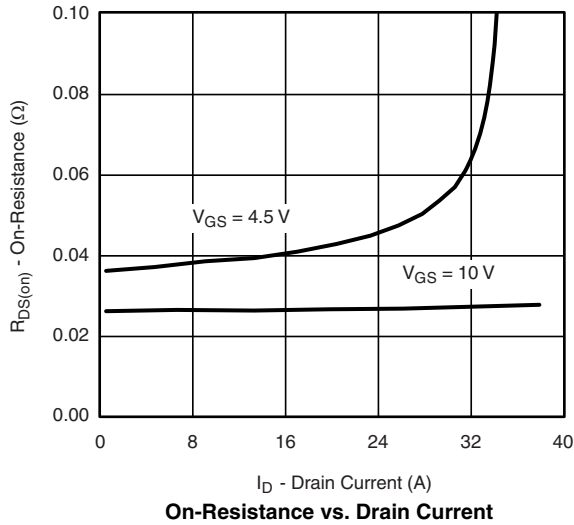
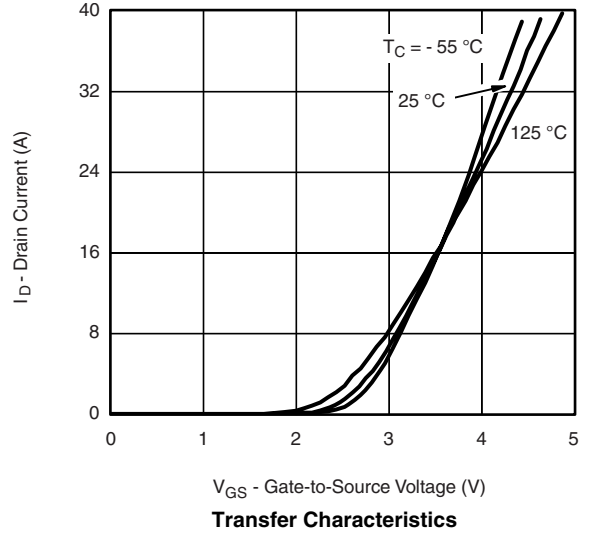
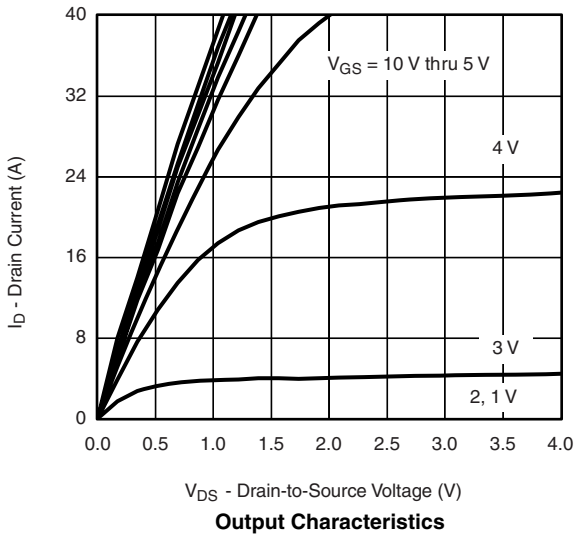


$T_J$  - Junction Temperature ( $^{\circ}C$ )  
**On-Resistance vs. Junction Temperature**

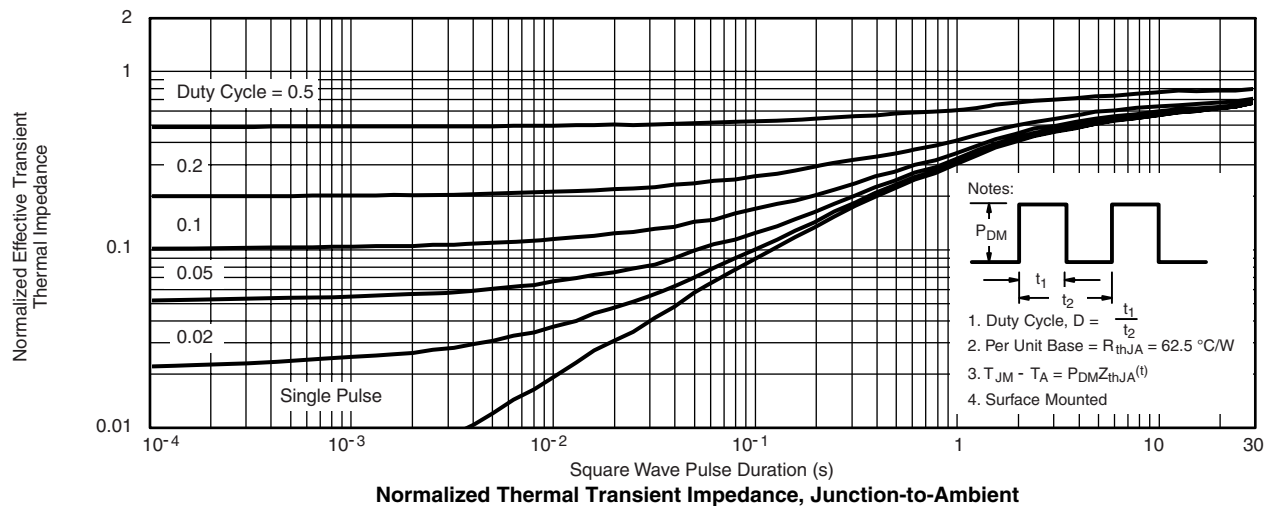
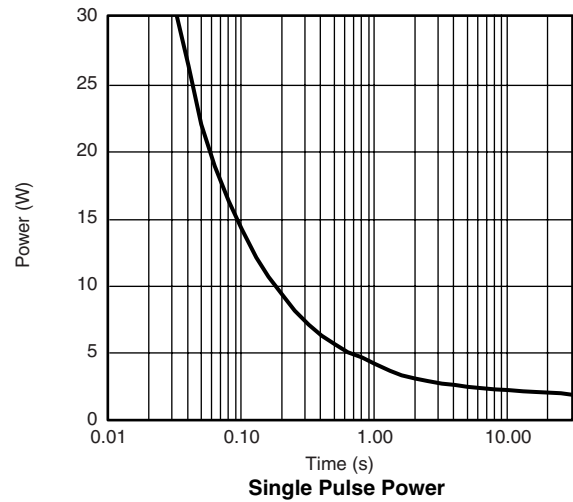
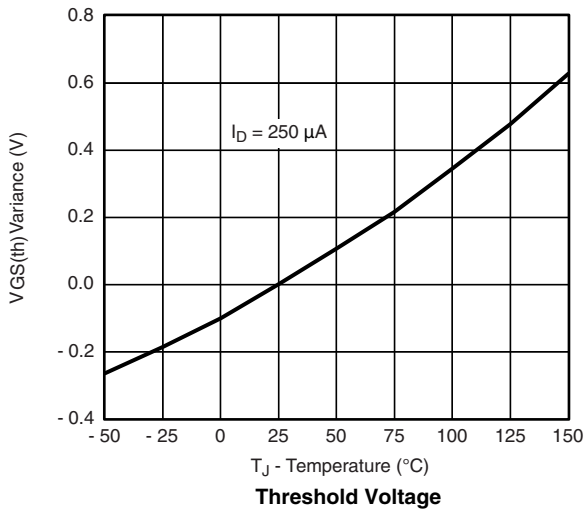
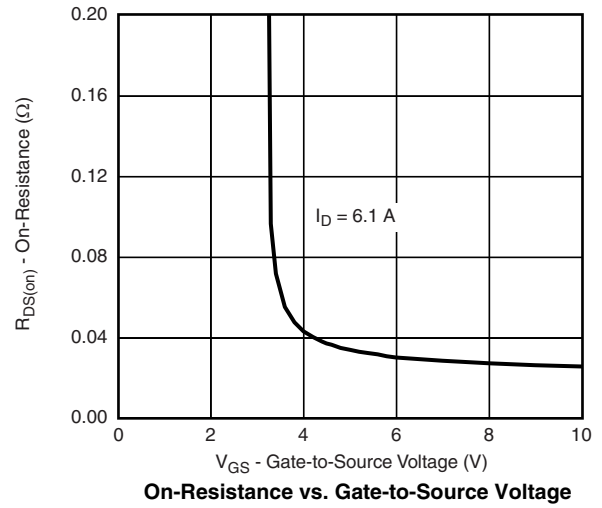
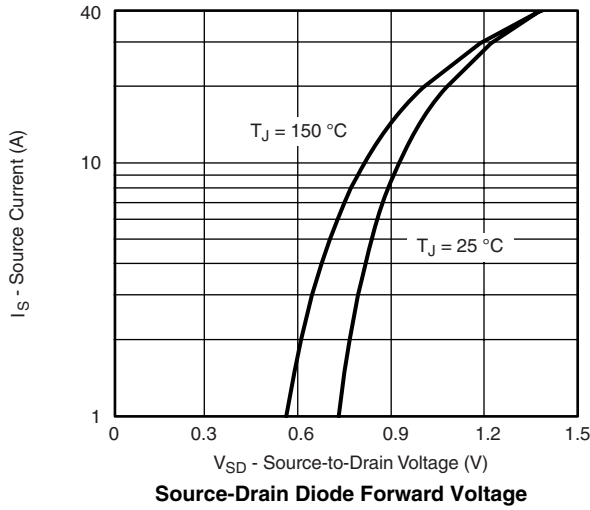
## N-CHANNEL TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



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



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



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