

## P-Channel 12-V (D-S) MOSFET

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
- 12	0.0065 at V <sub>GS</sub> = - 4.5 V	- 14
	0.00775 at V <sub>GS</sub> = - 2.5 V	- 13
	0.01025 at V <sub>GS</sub> = - 1.8 V	- 12

### FEATURES

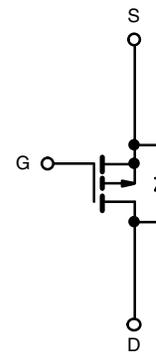
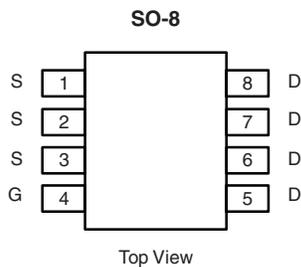
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



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

### APPLICATIONS

- Load Switch
- Battery Switch



P-Channel MOSFET

**Ordering Information:** Si4453DY-T1-E3 (Lead (Pb)-free)  
Si4453DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted					
Parameter	Symbol	10 s	Steady State	Unit	
Drain-Source Voltage	V <sub>DS</sub>	- 12		V	
Gate-Source Voltage	V <sub>GS</sub>	± 8			
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 14	- 10	A
		T <sub>A</sub> = 70 °C	- 11.5	- 8	
Pulsed Drain Current	I <sub>DM</sub>	- 50		A	
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	- 2.7	- 1.36		
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	3.0	1.5	W
		T <sub>A</sub> = 70 °C	1.9	0.95	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	t ≤ 10 s	33	42	°C/W
		Steady State	70	84	
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	16	21		

Notes:

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



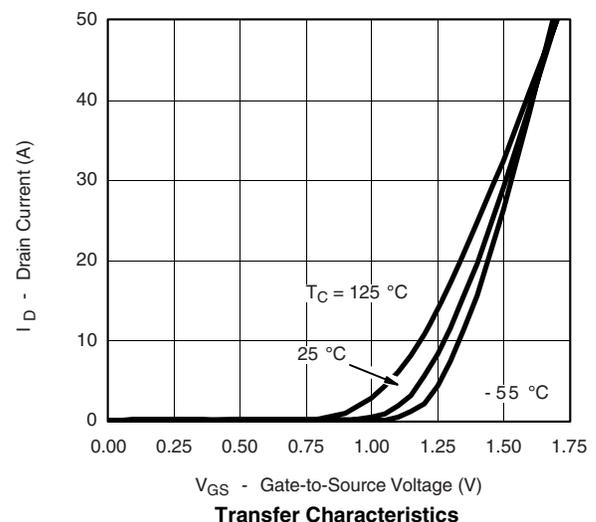
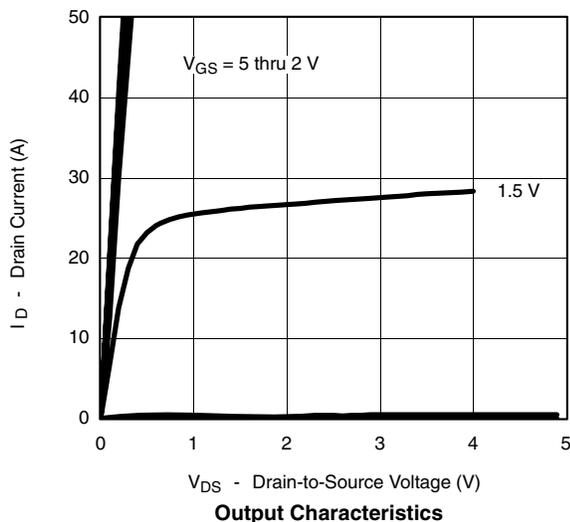
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -600\text{ }\mu\text{A}$	-0.4		-0.9	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -12\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -12\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	-30			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -14\text{ A}$		0.0051	0.0065	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -13\text{ A}$		0.0062	0.00775	
		$V_{GS} = -1.8\text{ V}, I_D = -12\text{ A}$		0.0082	0.01025	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -6\text{ V}, I_D = -14\text{ A}$		80		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -2.7\text{ A}, V_{GS} = 0\text{ V}$		-0.6	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -6\text{ V}, V_{GS} = -5\text{ V}, I_D = -14\text{ A}$		110	165	nC
Gate-Source Charge	$Q_{gs}$		15			
Gate-Drain Charge	$Q_{gd}$		27.5			
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -6\text{ V}, R_L = 6\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$		110	170	ns
Rise Time	$t_r$		235	350		
Turn-Off Delay Time	$t_{d(off)}$		410	620		
Fall Time	$t_f$		285	430		
Gate Resistance	$R_g$			3.6		$\Omega$
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = -2.1\text{ A}, dl/dt = 100\text{ A}/\mu\text{s}$		180	270	ns

Notes:

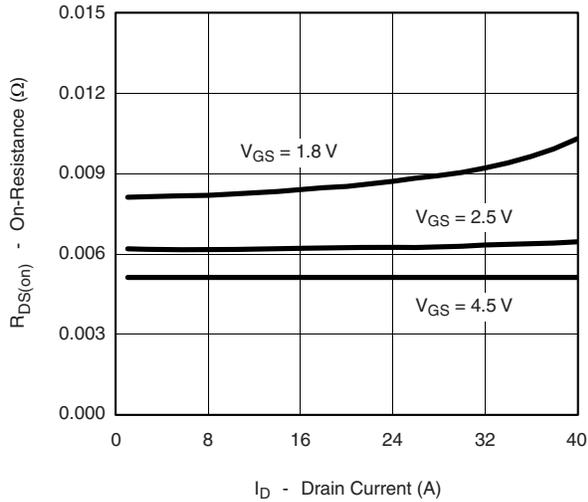
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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.

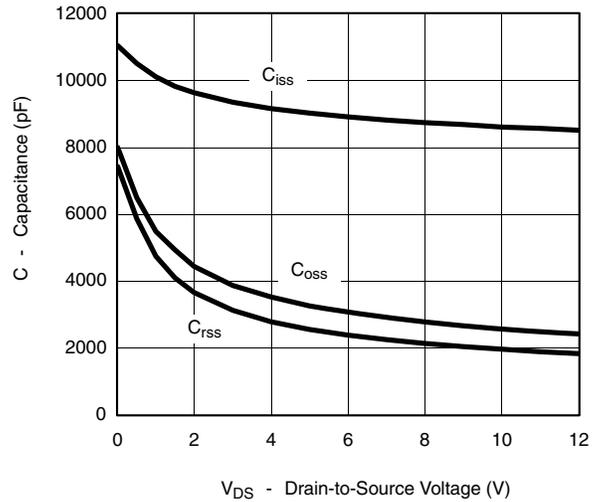
**TYPICAL CHARACTERISTICS**  $25\text{ }^\circ\text{C}$  unless otherwise noted



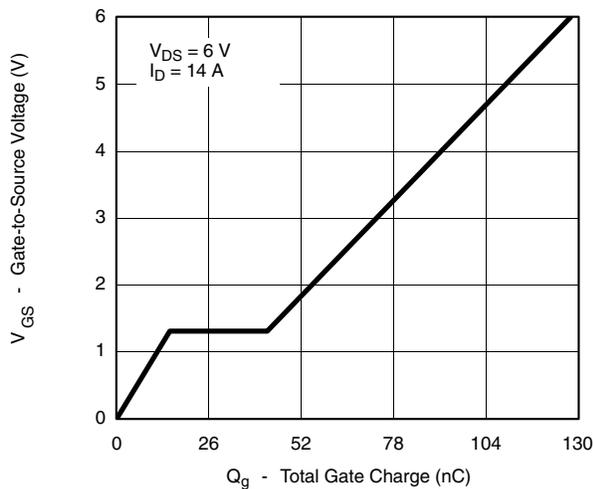
## TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



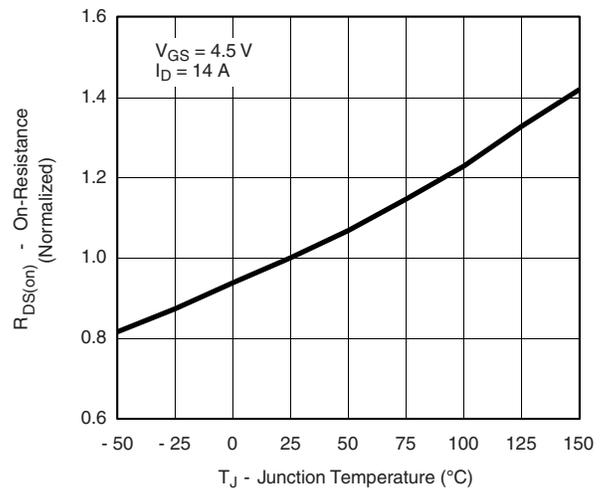
**On-Resistance vs. Drain Current**



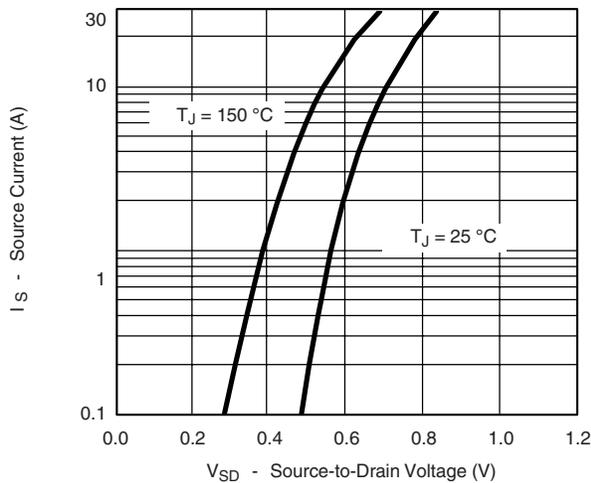
**Capacitance**



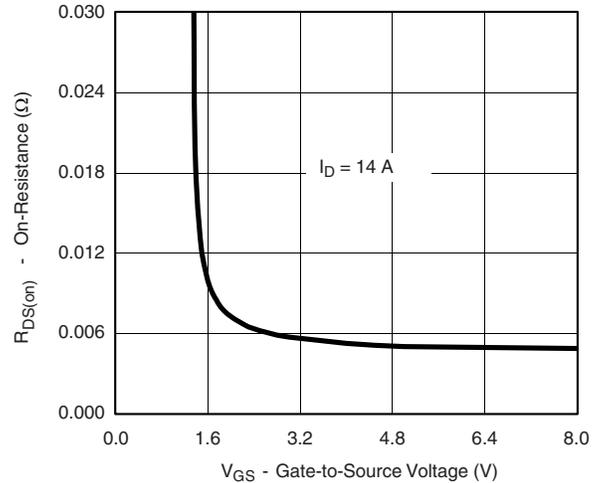
**Gate Charge**



**On-Resistance vs. Junction Temperature**

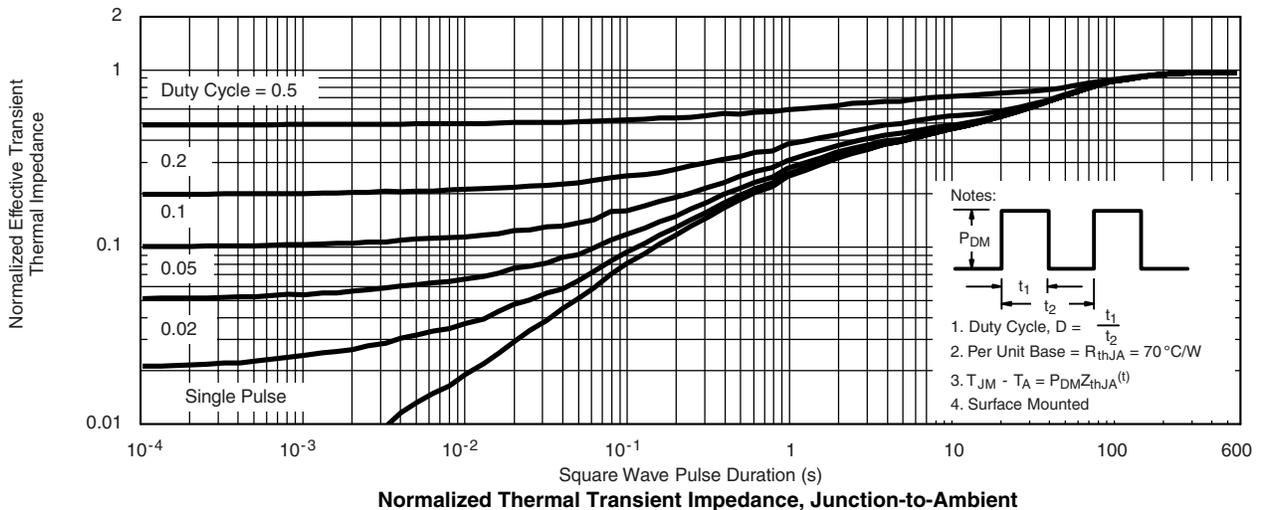
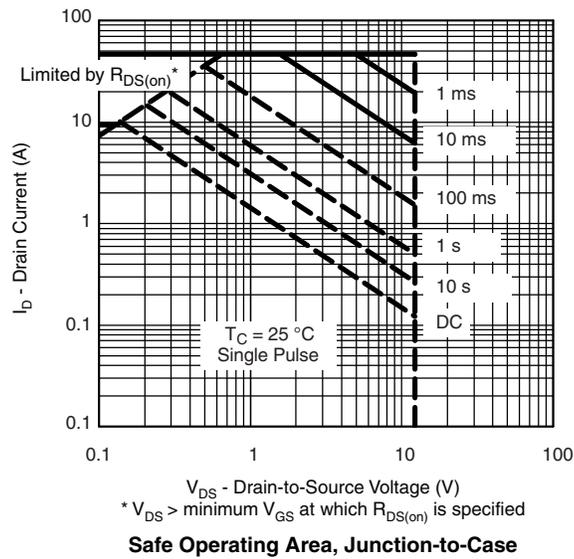
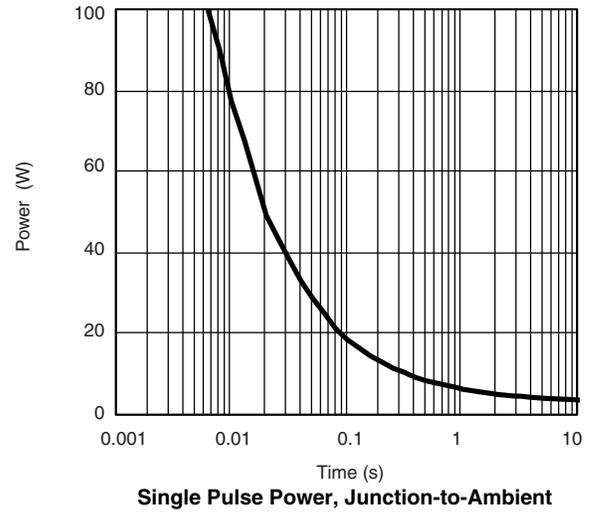
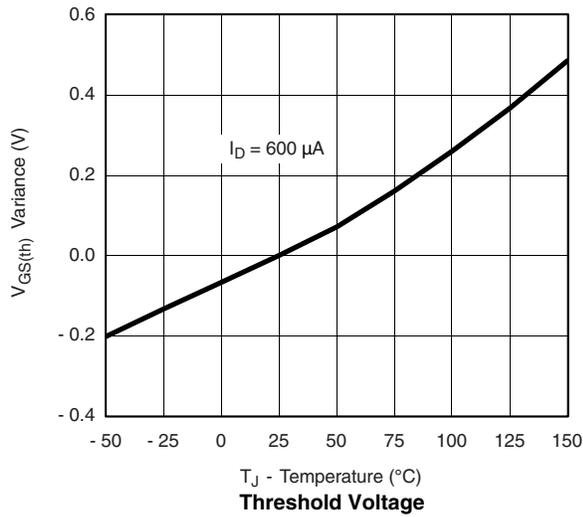


**Source-Drain Diode Forward Voltage**



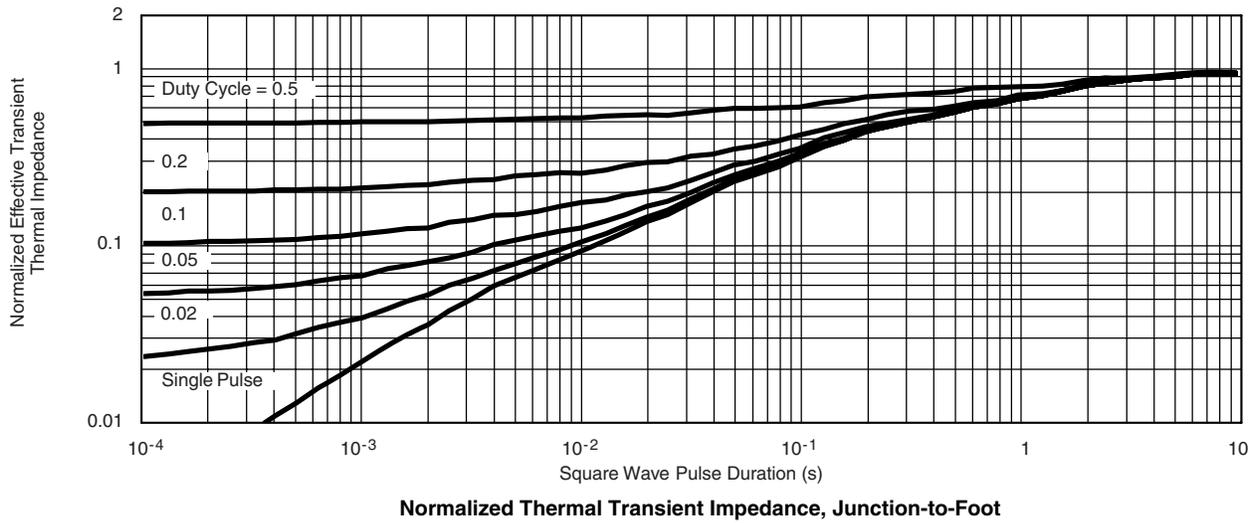
**On-Resistance vs. Gate-to-Source Voltage**

**TYPICAL CHARACTERISTICS** 25 °C unless otherwise noted





**TYPICAL CHARACTERISTICS** 25 °C unless otherwise noted



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