

SI9431DY-T1-E3-VB Datasheet

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 12	0.0050 at $V_{GS} = - 4.5$ V	- 16
	0.0065 at $V_{GS} = - 2.5$ V	- 15
	0.0100 at $V_{GS} = - 1.8$ V	- 13

FEATURES

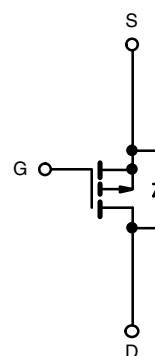
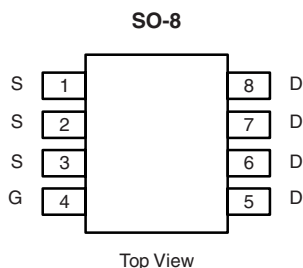
- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFET
- Compliant to RoHS Directive 2002/95/EC

APPLICATIONS

- Load Switch
- Battery Switch



RoHS
COMPLIANT
HALOGEN
FREE
Available



P-Channel MOSFET

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

Parameter	Symbol	10 s	Steady State	Unit
Drain-Source Voltage	V_{DS}	- 12		V
Gate-Source Voltage	V_{GS}	± 8		
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	- 16	- 10	A
		- 11.5	- 8	
Pulsed Drain Current	I_{DM}	- 50		
Continuous Source Current (Diode Conduction) ^a	I_S	- 2.7	- 1.36	W
Maximum Power Dissipation ^a	P_D	3.0	1.5	
		1.9	0.95	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150		°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	R_{thJA}	33	42	°C/W
		70	84	
Maximum Junction-to-Foot (Drain)	R_{thJF}	16	21	

Notes:

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

SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted

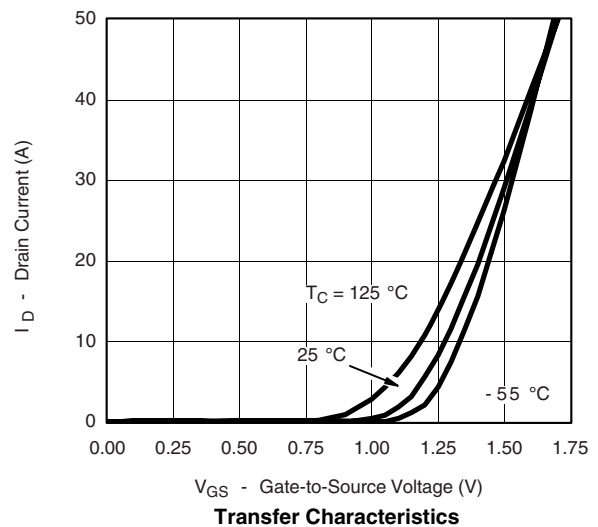
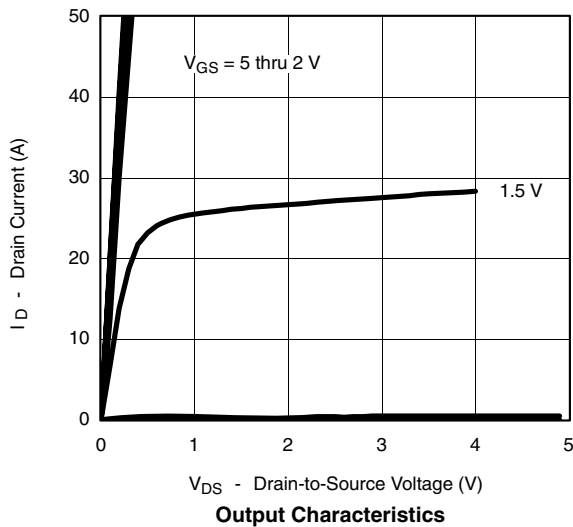
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -600\ \mu\text{A}$	-0.5	-	1.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}$, $V_{GS} = \pm 8\ \text{V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -12\ \text{V}$, $V_{GS} = 0\ \text{V}$			-1	μA
		$V_{DS} = -12\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_J = 70^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\ \text{V}$, $V_{GS} = -4.5\ \text{V}$	-30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\ \text{V}$, $I_D = -14\ \text{A}$		0.0050		Ω
		$V_{GS} = -2.5\ \text{V}$, $I_D = -13\ \text{A}$		0.0065		
		$V_{GS} = -1.8\ \text{V}$, $I_D = -12\ \text{A}$		0.0100		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -6\ \text{V}$, $I_D = -14\ \text{A}$		80		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -2.7\ \text{A}$, $V_{GS} = 0\ \text{V}$		-0.6	-1.1	V
Dynamic^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	$t_{d(on)}$	$V_{DD} = -6\ \text{V}$, $R_L = 6\ \Omega$ $I_D \approx -1\ \text{A}$, $V_{GEN} = -4.5\ \text{V}$, $R_g = 6\ \Omega$		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		Ω
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -2.1\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$		180	270	ns

Notes:

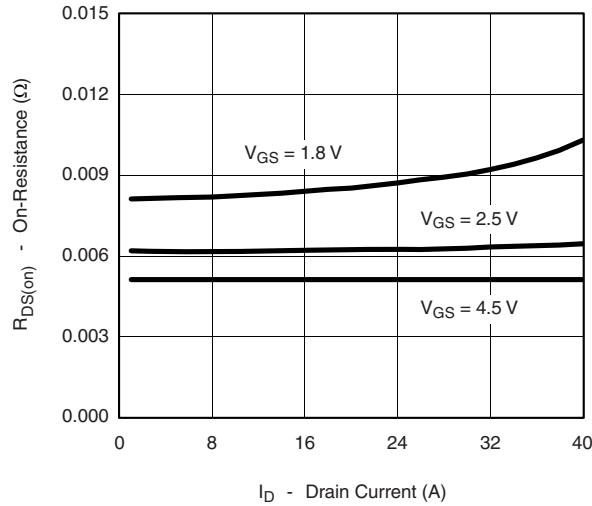
a. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

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

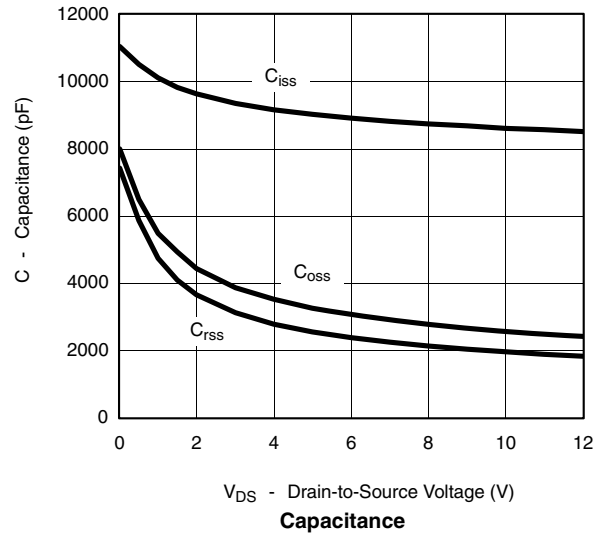
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS 25°C unless otherwise noted

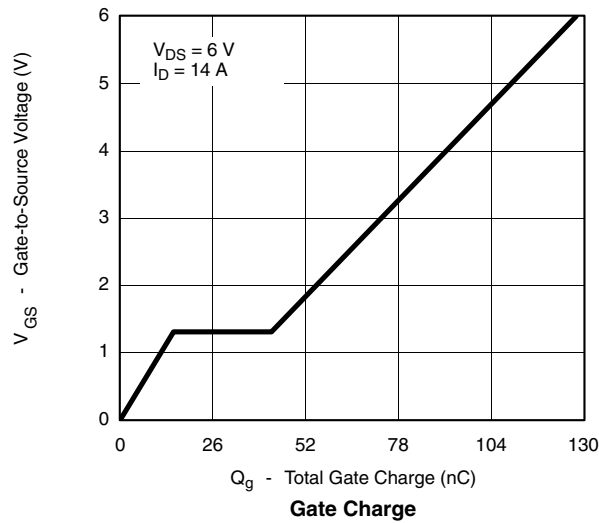
TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



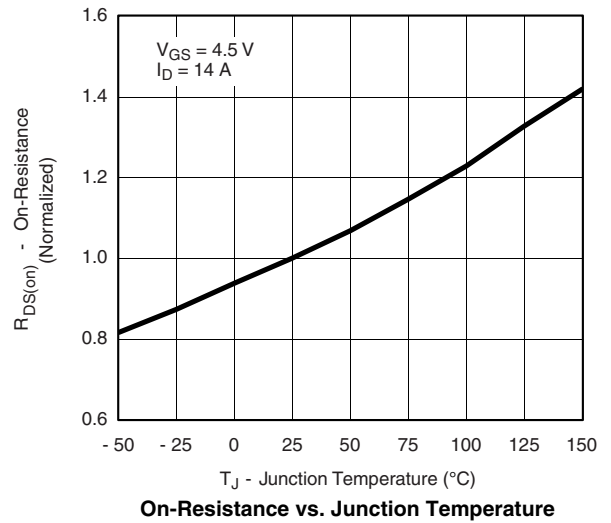
On-Resistance vs. Drain Current



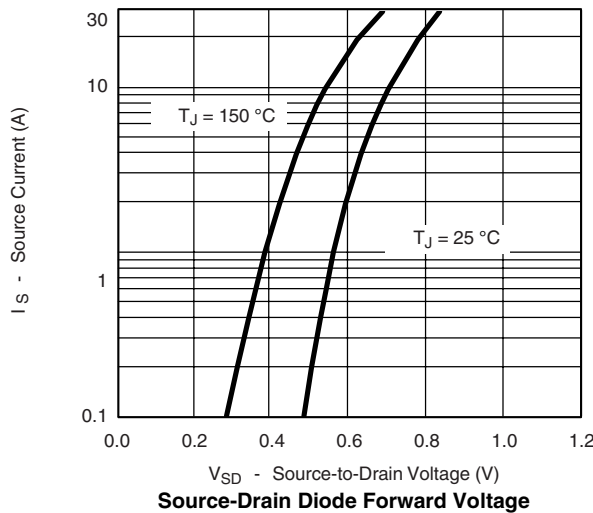
Capacitance



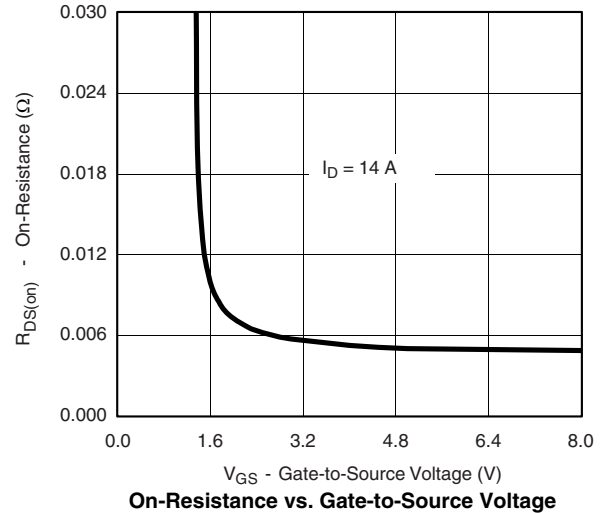
Gate Charge



On-Resistance vs. Junction Temperature

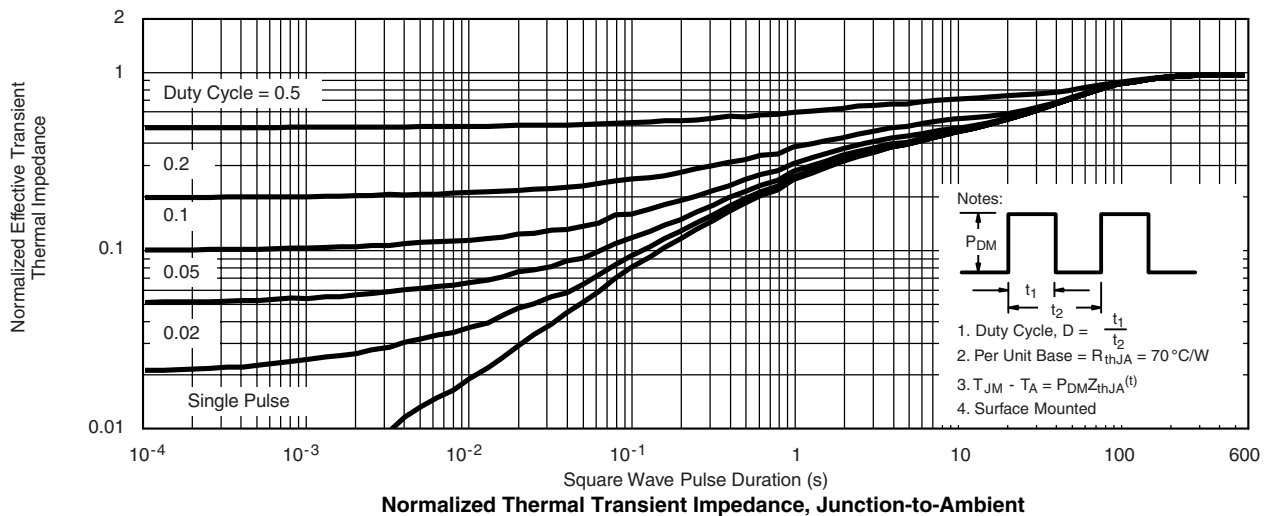
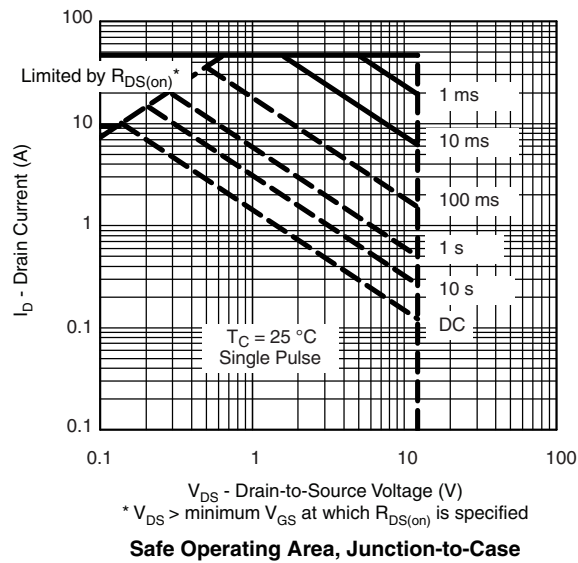
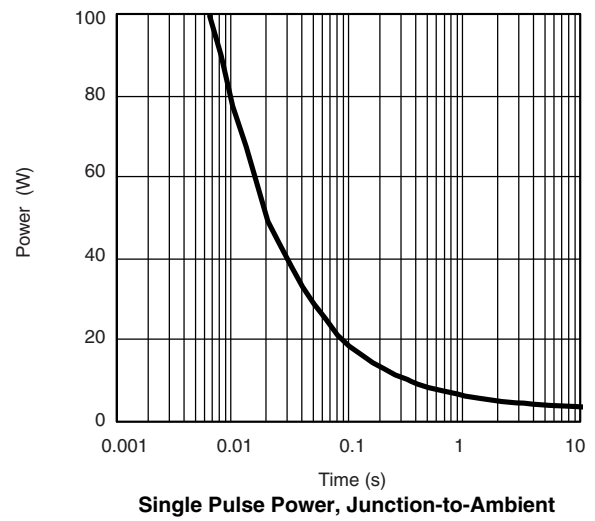
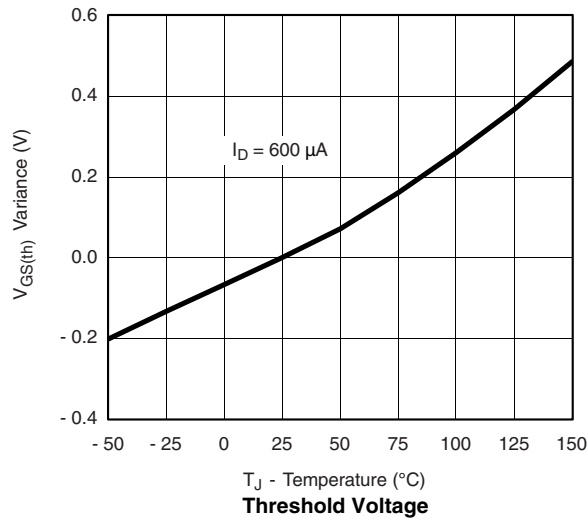


Source-Drain Diode Forward Voltage

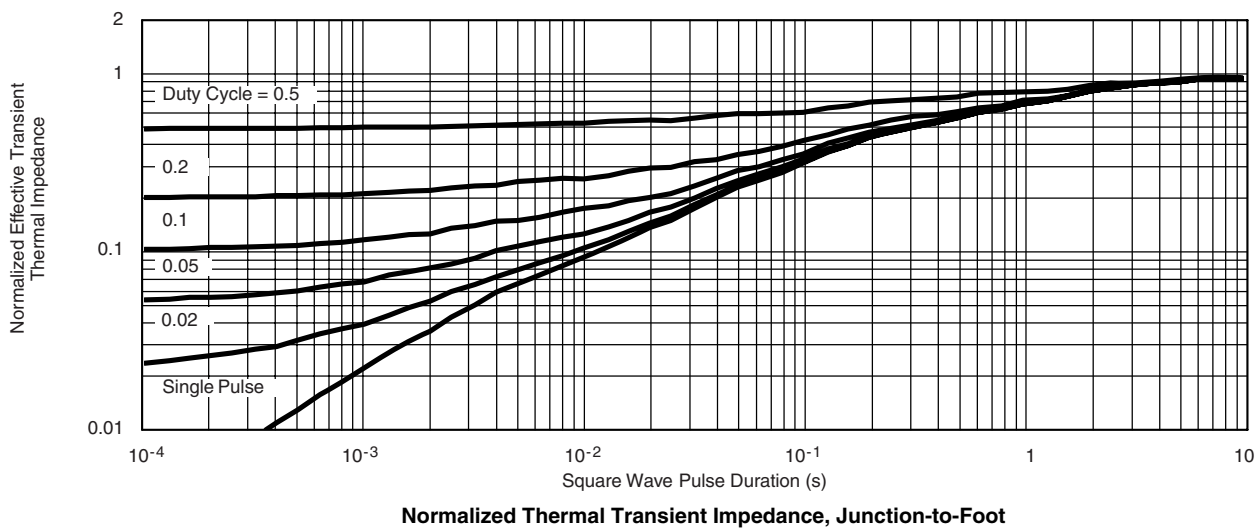


On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



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