

P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
- 30	0.030 at $V_{GS} = - 10$ V	- 7.5
	0.050 at $V_{GS} = - 4.5$ V	- 5.8

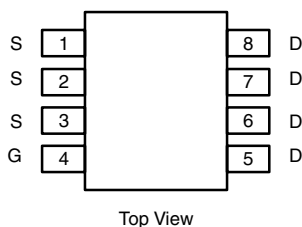
FEATURES

- TrenchFET® Power MOSFETs



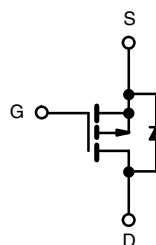
RoHS*
COMPLIANT

SO-8



Top View

Ordering Information: Si4431BDY-T1
Si4431BDY-T1-E3 (Lead (Pb)-free)



P-Channel MOSFET

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

Parameter	Symbol	10 sec	Steady State	Unit
Drain-Source Voltage	V_{DS}	- 30		V
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	- 7.5	- 5.7	A
		- 6.0	- 4.6	
Pulsed Drain Current	I_{DM}	- 30		
Continuous Source Current (Diode Conduction) ^a	I_S	- 2.1	- 1.2	
Maximum Power Dissipation ^a	P_D	2.5	1.5	W
		1.6	0.9	
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}	38	50	°C/W
		70	85	
Maximum Junction-to-Foot	R_{thJF}	22	28	

Notes:

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

* Pb containing terminations are not RoHS compliant, exemptions may apply.

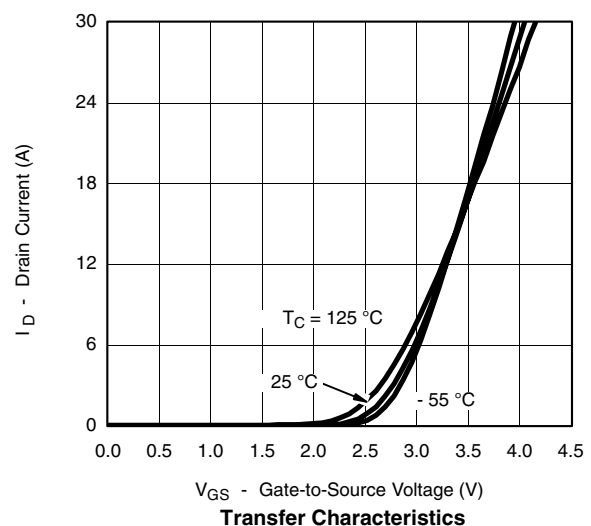
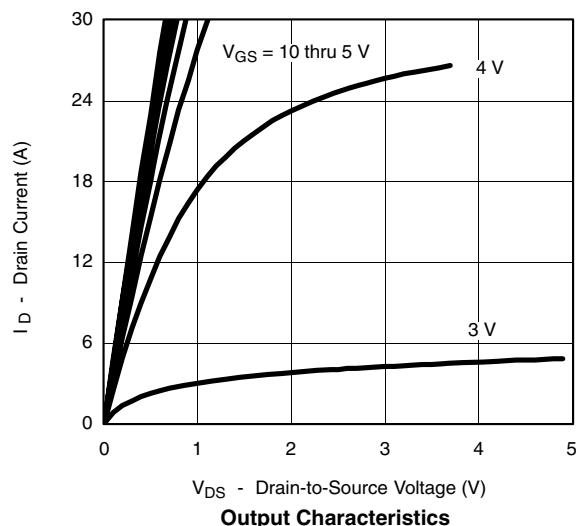
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	-1.0		-3.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30\text{ V}$, $V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -30\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 70\text{ }^{\circ}\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}$, $V_{GS} = -10\text{ V}$	-30			A
		$V_{DS} = -5\text{ V}$, $V_{GS} = -4.5\text{ V}$	-7			
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -7.5\text{ A}$		0.023	0.030	Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -5.8\text{ A}$		0.036	0.050	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}$, $I_D = -7.5\text{ A}$		18		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -2.1\text{ A}$, $V_{GS} = 0\text{ V}$		-0.78	-1.1	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}$, $V_{GS} = -5\text{ V}$, $I_D = -7.5\text{ A}$		13	20	nC
Gate-Source Charge	Q_{gs}			3.6		
Gate-Drain Charge	Q_{gd}			6		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong -1\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_G = 6\text{ }\Omega$		10	20	ns
Rise Time	t_r			10	20	
Turn-Off Delay Time	$t_{d(off)}$			70	110	
Fall Time	t_f			47	70	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -2.1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		45	80	

Notes:

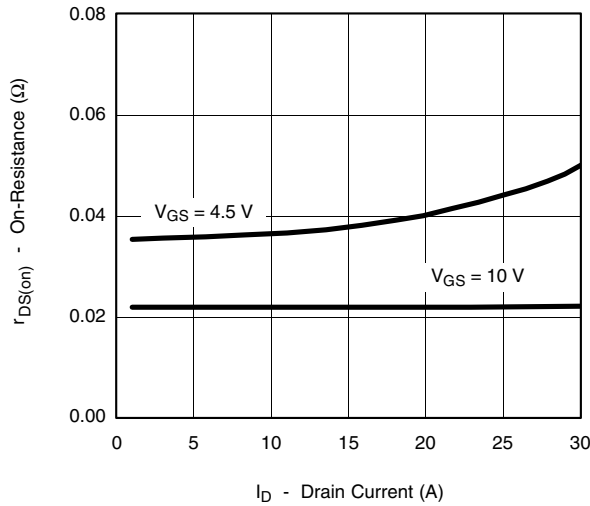
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

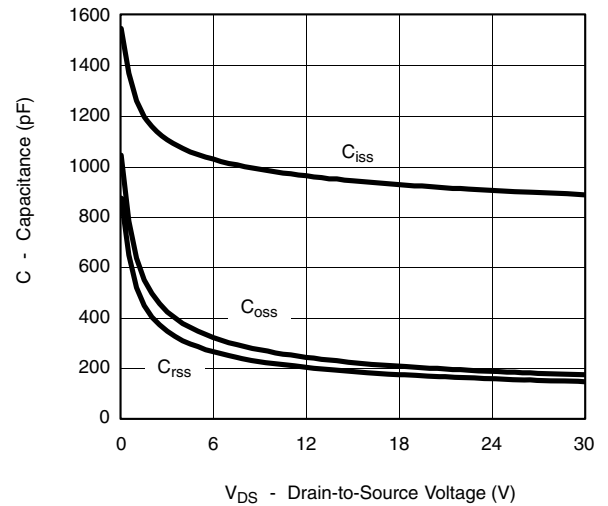
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

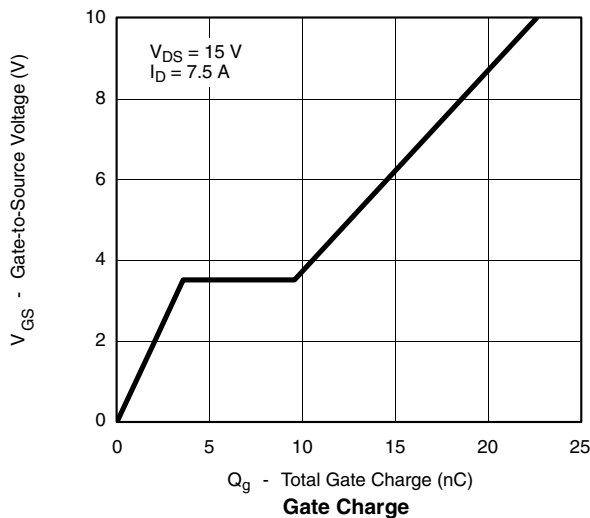
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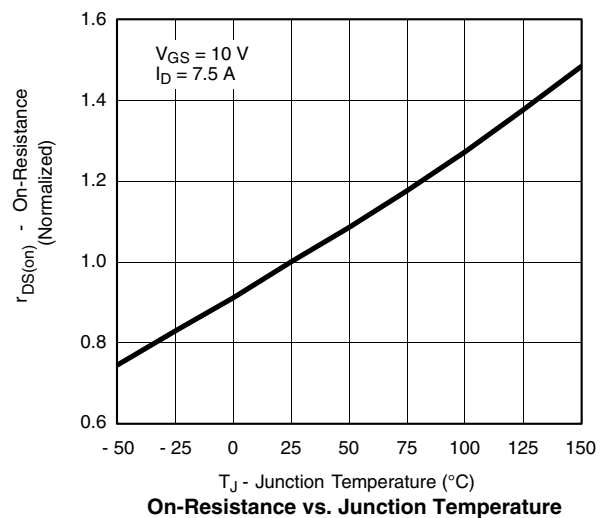
On-Resistance vs. Drain Current



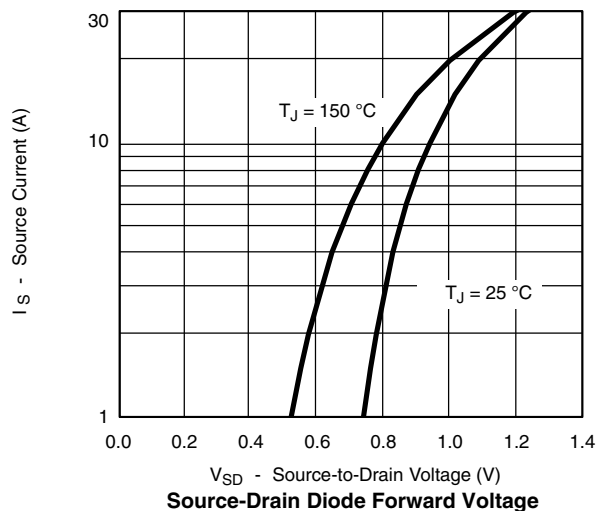
Capacitance



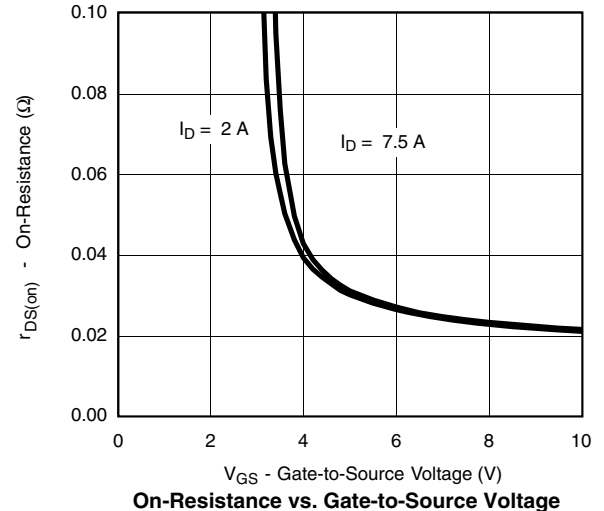
Gate Charge



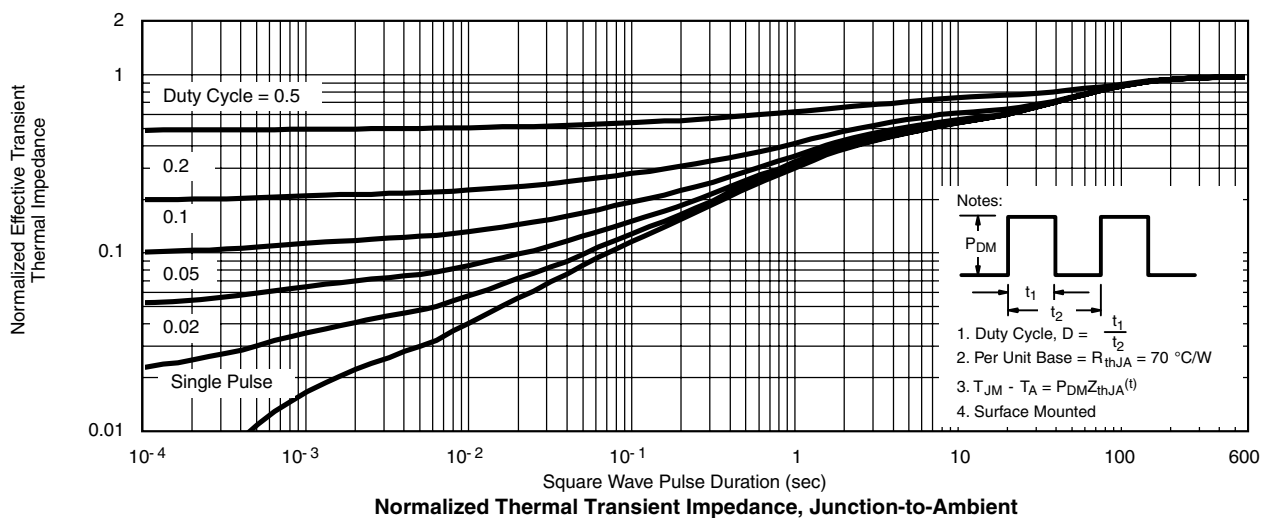
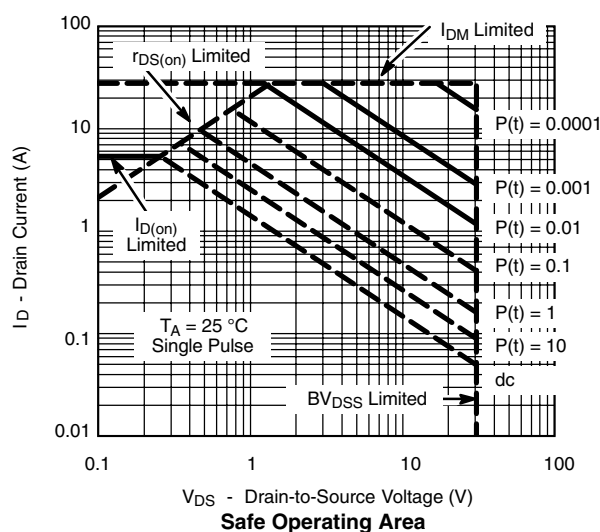
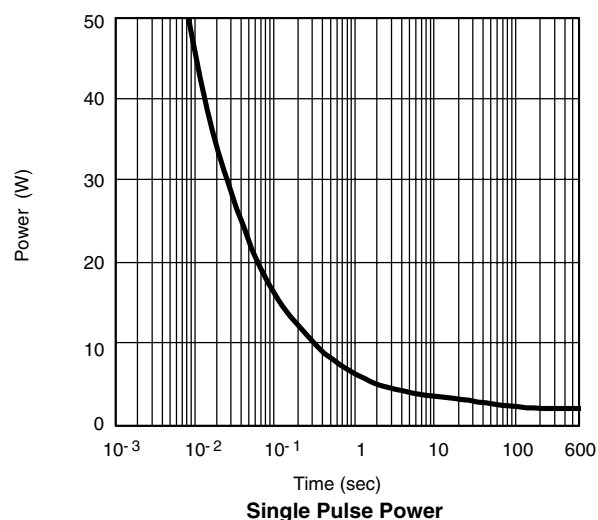
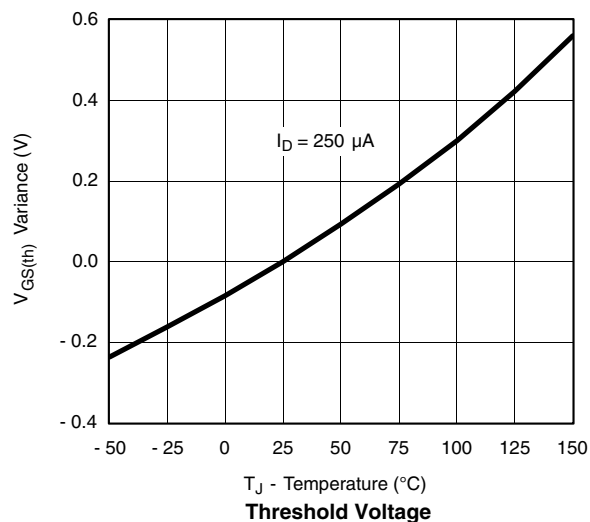
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

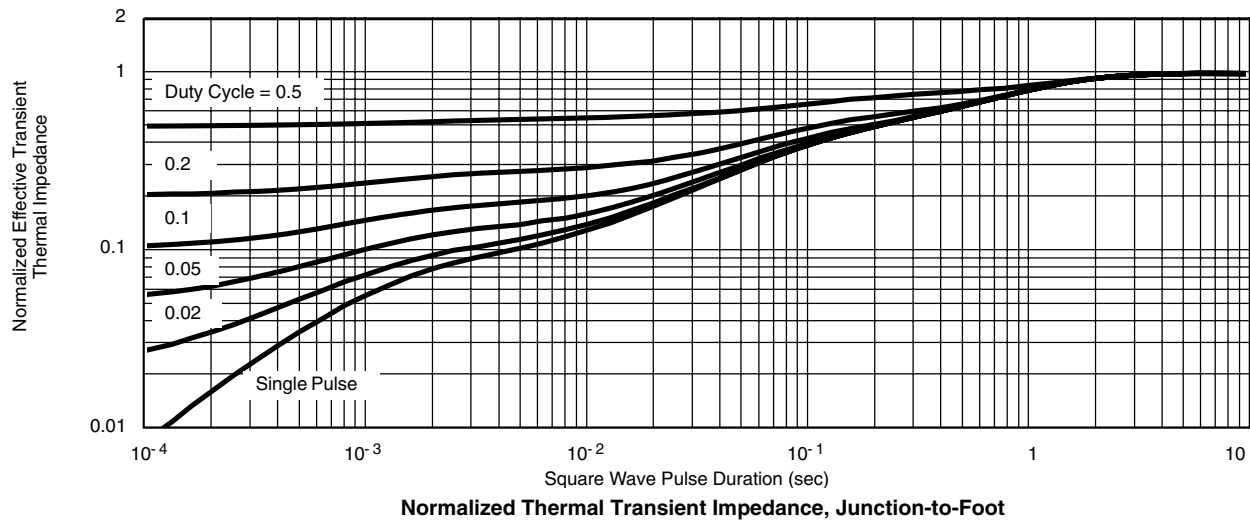


On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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