

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

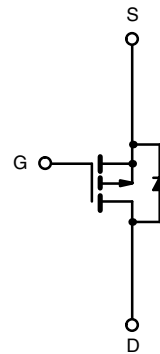
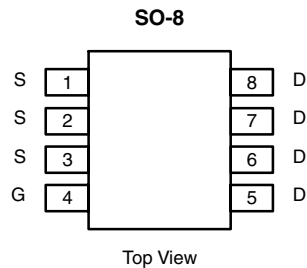
PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
-30	0.030 @ $V_{GS} = -10$ V	-7.2
	0.052 @ $V_{GS} = -4.5$ V	-5.5

### FEATURES

- TrenchFET® Power MOSFET



**RoHS**  
COMPLIANT



P-Channel MOSFET

Ordering Information: Si4431ADY-T1  
Si4431ADY-T1—E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	10 secs	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	-30		V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$			
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>	$I_D$	$T_A = 25^\circ\text{C}$	-7.2	-5.3	A
		$T_A = 70^\circ\text{C}$	-5.8	-4.2	
Pulsed Drain Current	$I_{DM}$	-30			
continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	-2.1	-1.3		
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25^\circ\text{C}$	2.5	1.35	W
		$T_A = 70^\circ\text{C}$	1.6	0.87	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	$t \leq 10$ sec	35	50	$^\circ\text{C}/\text{W}$
		Steady State	75	92	
Maximum Junction-to-Foot	$R_{thJF}$	17	25		

Notes

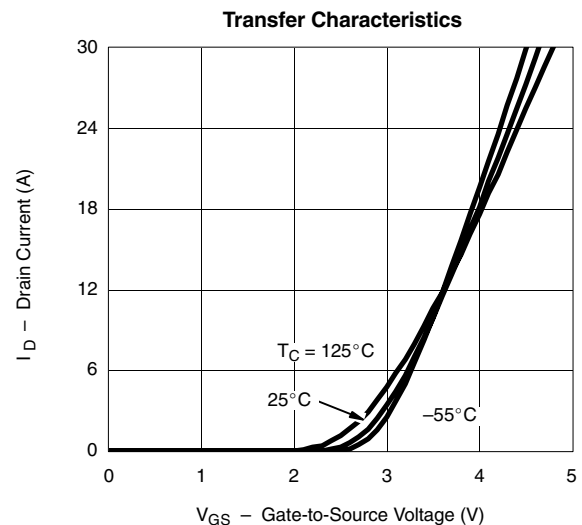
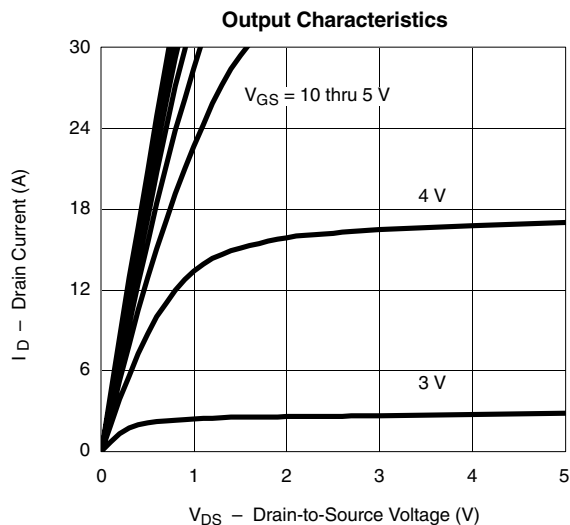
a. Surface Mounted on 1" x 1" FR4 Board.

**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-1.0		-3.0	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V			-1	μA
		V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70 °C			-10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -10 V	-30			A
		V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -4.5 V	-7			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -7.2 A		0.024	0.030	Ω
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -5.0 A		0.040	0.052	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -7.2 A		14		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = -2.1 A, V <sub>GS</sub> = 0 V		-0.78	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = -5 V, I <sub>D</sub> = -7.2 A		12	20	nC
Gate-Source Charge	Q <sub>gs</sub>			4.7		
Gate-Drain Charge	Q <sub>gd</sub>			3.7		
Gate Resistance	R <sub>G</sub>			3.1	4.7	Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -15 V, R <sub>L</sub> = 15 Ω I <sub>D</sub> ≅ -1 A, V <sub>GEN</sub> = -10 V, R <sub>G</sub> = 6 Ω		12	20	ns
Rise Time	t <sub>r</sub>			15	20	
Turn-Off Delay Time	t <sub>d(off)</sub>			40	60	
Fall Time	t <sub>f</sub>			20	25	
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = -2.1 A, di/dt = 100 A/μs		30	80	

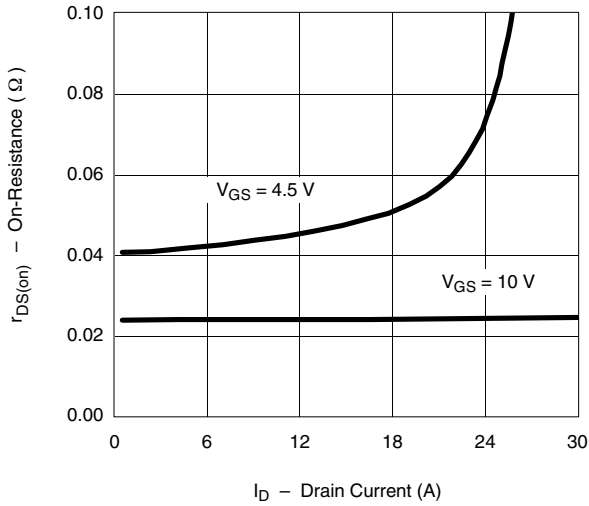
## Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.  
b. Guaranteed by design, not subject to production testing.

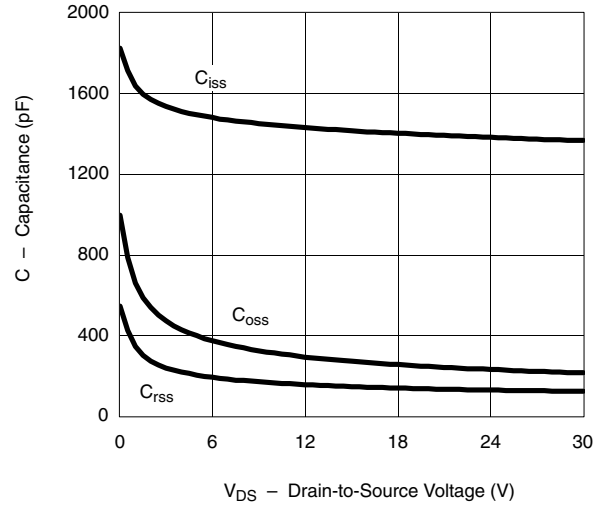
**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

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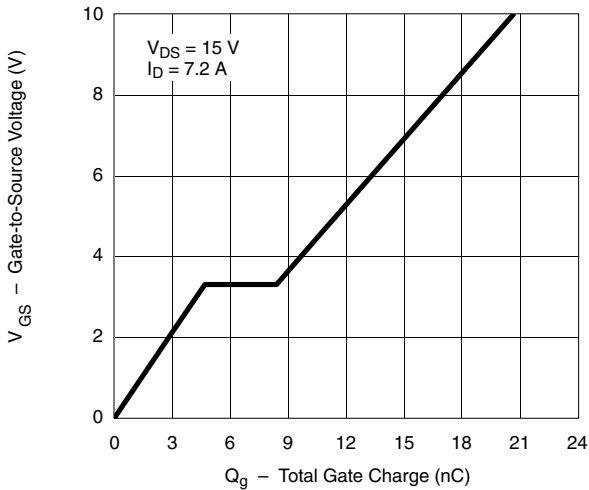
On-Resistance vs. Drain Current



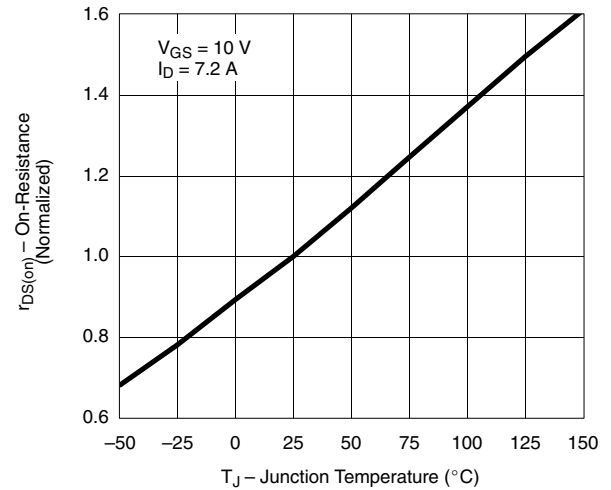
Capacitance



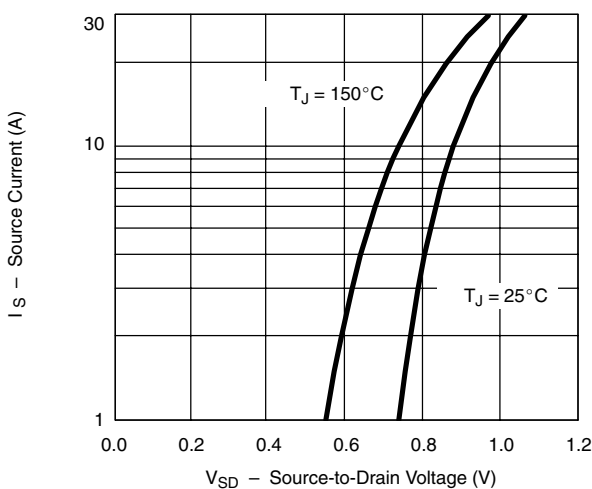
Gate Charge



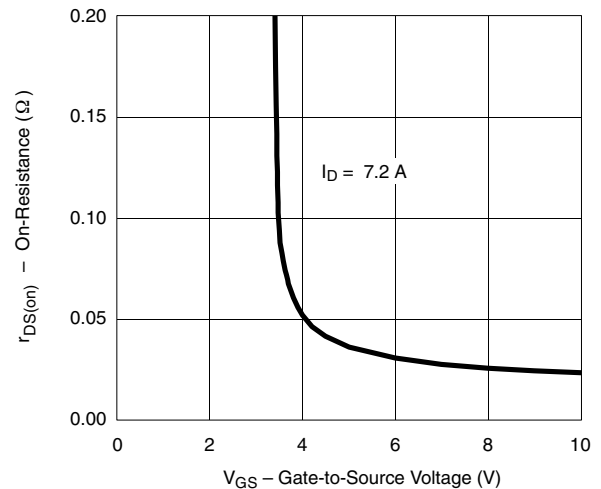
On-Resistance vs. Junction Temperature



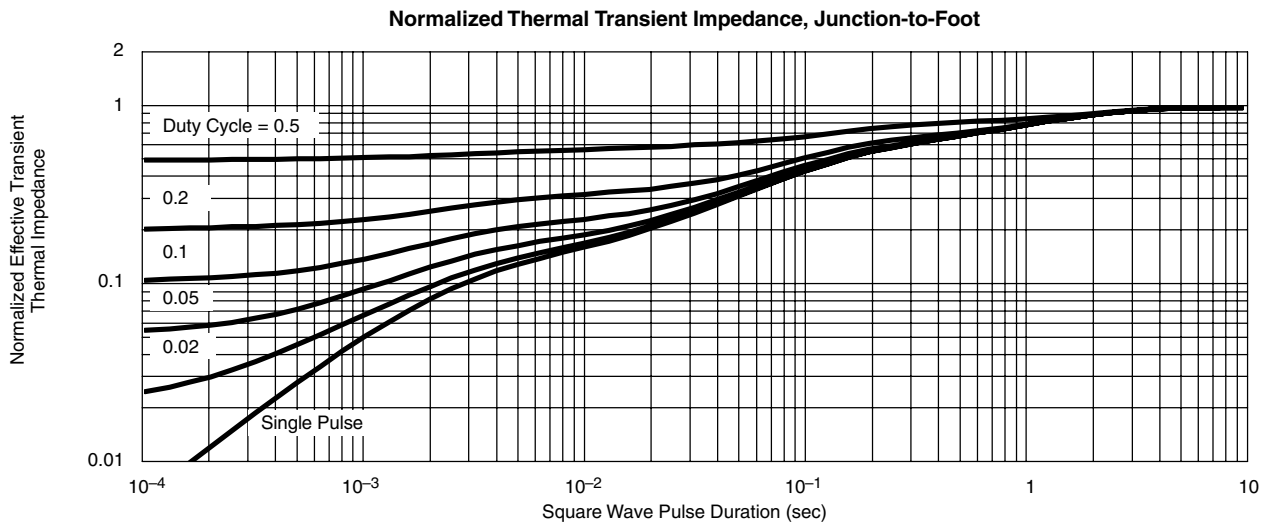
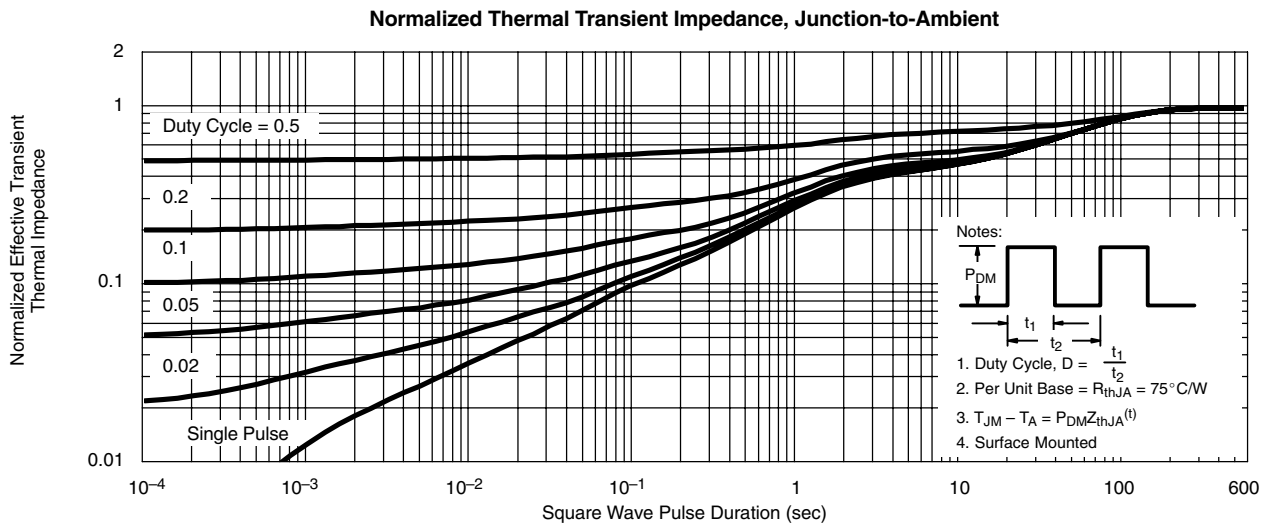
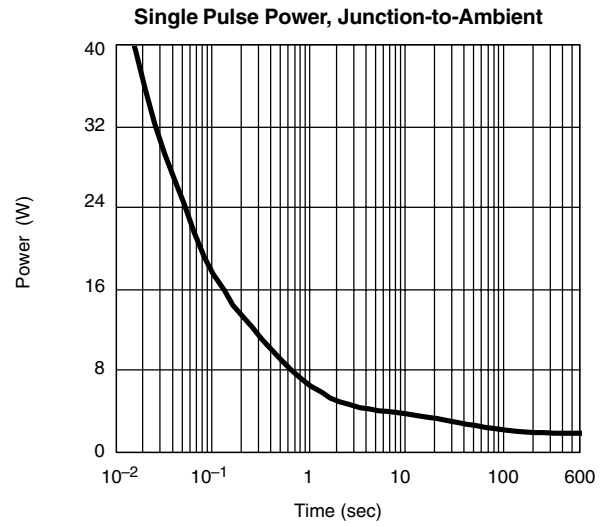
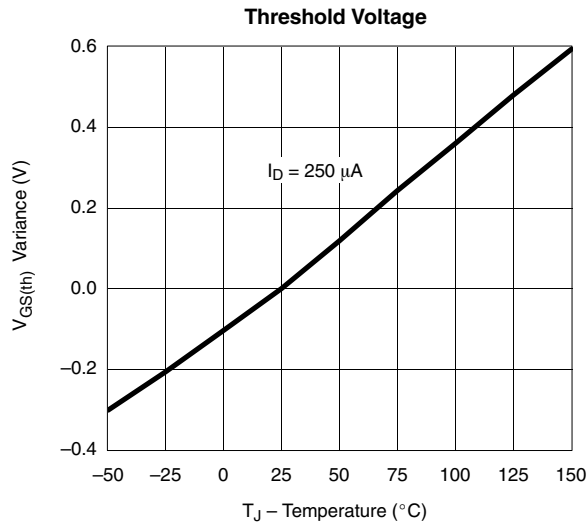
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



## TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)





## Disclaimer

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