N-Channel 30-V (D-S), Reduced Qg Fast Switching MOSFET with Schottky Diode

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
30	0.0185 @ V_{GS} = 10 V	9
	0.033 @ V_{GS} = 4.5 V	7

SCHOTTKY PRODUCT SUMMARY		
V_{DS} (V)	V_{SD} (v) Diode Forward Voltage	I_F (A)
30	0.5 V @ 1 A	2.0

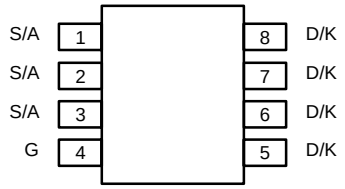
FEATURES

- TrenchFET® Power MOSFET
- LITTLE FOOT *Plus*™ *Integrated Schottky*
- PWM Optimized

APPLICATIONS

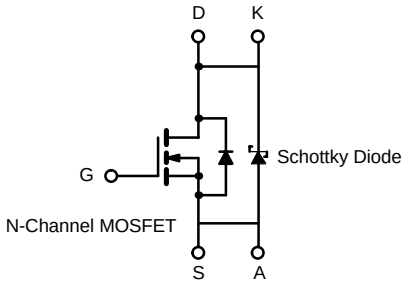
- Low Power Sychronous Rectification

SO-8



Top View

Ordering Information: Si4300DY
Si4300DY-T1 (with Tape and Reel)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)					
Parameter		Symbol	10 secs	Steady State	Unit
Drain-Source Voltage (MOSFET)		V_{DS}	30		V
Reverse Voltage (Schottky)		V_{DA}	30		
Gate-Source Voltage		V_{GS}	±20		
Continuous Drain Current (T_J = 150°C) (MOSFET)[a]	T_A = 25°C	I_D	9	6.4	A
	T_A = 70°C		7	5.1	
Pulsed Drain Current (MOSFET)		I_{DM}	40		
Continuous Source Current (MOSFET Diode Conduction)[a]		I_S	2.3	1.25	
Average Foward Current (Schottky)		I_F	2.3	1.25	
Pulsed Foward Current (Schottky)		I_{FM}	20		
Maximum Power Dissipation (MOSFET)[a]	T_A = 25°C	P_D	2.5	1.38	W
	T_A = 70°C		1.6	0.88	
Maximum Power Dissipation (Schottky)[a]	T_A = 25°C		2.2	1.25	
	T_A = 70°C		1.4	0.80	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150		°C

THERMAL RESISTANCE RATINGS							
			MOSFET		Schottky		
Parameter		Symbol	Typ	Max	Typ	Max	Unit
Maximum Junction-to-Ambient[a]	t ≤ 10 sec	R_{thJA}	40	50	45	55	°C/W
	Steady-State		70	90	78	100	
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	18	23	25	30	

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

MOSFET SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED).

Parameter	Symbol	Test Condition	Min	Typ[a]	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.8			V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24 V, V_{GS} = 0 V			100	µA
		V_{DS} = 24 V, V_{GS} = 0 V, T_J = 85°C			2000	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	30			A
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 9 A		0.0155	0.0185	Ω
		V_{GS} = 4.5 V, I_D = 7 A		0.0275	0.033	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 9 A		16		S
Schottky Diode Forward Voltage[b]	V_{SD}	I_S = 1.0 A, V_{GS} = 0 V		0.47	0.5	V
Dynamic[a]						
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 5 V, I_D = 9 A		8.7	13	nC
Gate-Source Charge	Q_{gs}			2.25		
Gate-Drain Charge	Q_{gd}			4.2		
Gate Resistance	R_g		0.5		2.7	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 15 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_G = 6 Ω		11	16	ns
Rise Time	t_r			8	15	
Turn-Off Delay Time	$t_{d(off)}$			22	30	
Fall Time	t_f			9	15	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 2.3 A, di/dt = 100 A/µs		32	60	

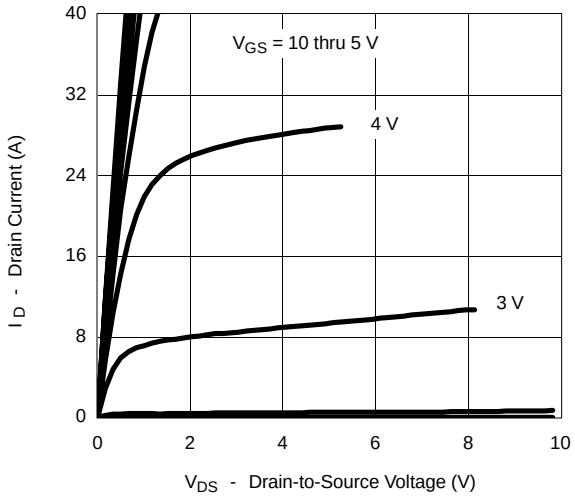
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.

SCHOTTKY SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

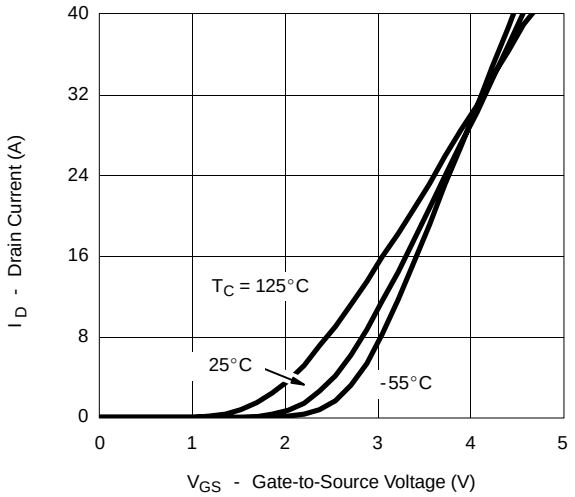
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V_F	I_F = 1.0 A		0.47	0.5	V
		I_F = 1.0 A, T_J = 125°C		0.36	0.42	
Maximum Reverse Leakage Current	I_{rm}	V_r = 24 V		0.004	0.100	mA
		V_r = 24 V, T_J = 100°C		0.7	10	
		V_r = -24 V, T_J = 125°C		3.0	20	
Junction Capacitance	C_T	V_r = 10 V		50		pF

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET

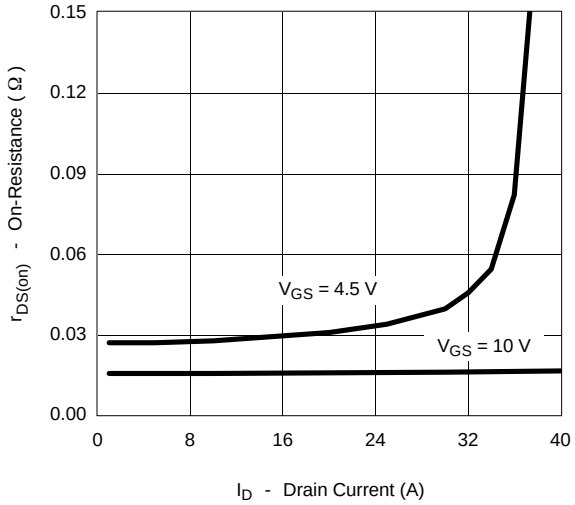
Output Characteristics



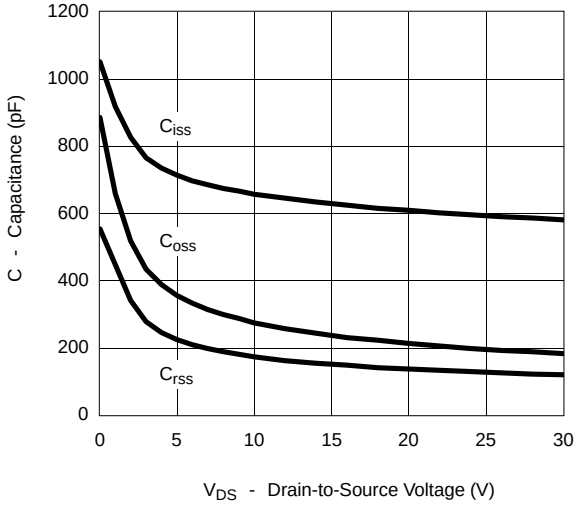
Transfer Characteristics



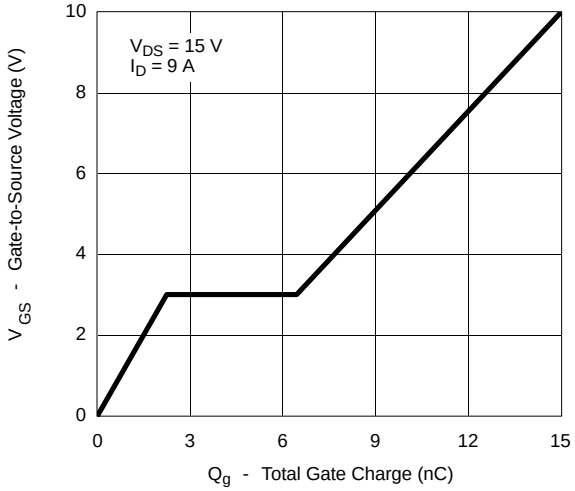
On-Resistance vs. Drain Current



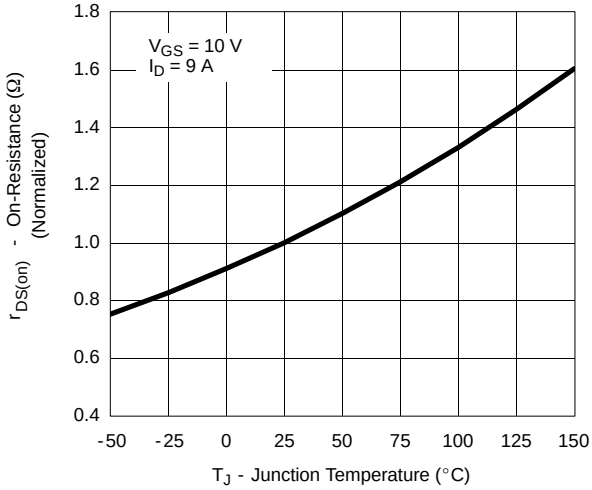
Capacitance



Gate Charge

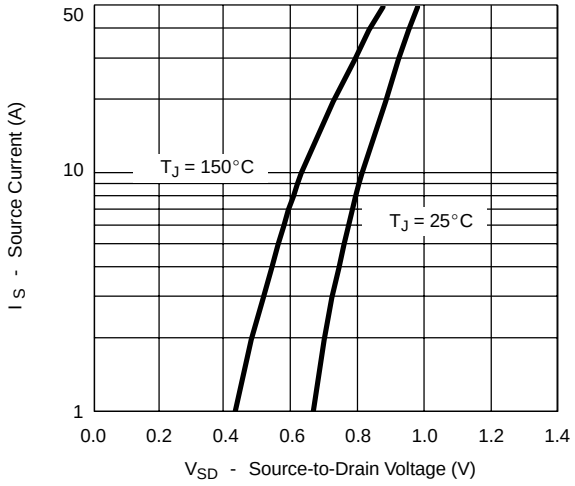


On-Resistance vs. Junction Temperature

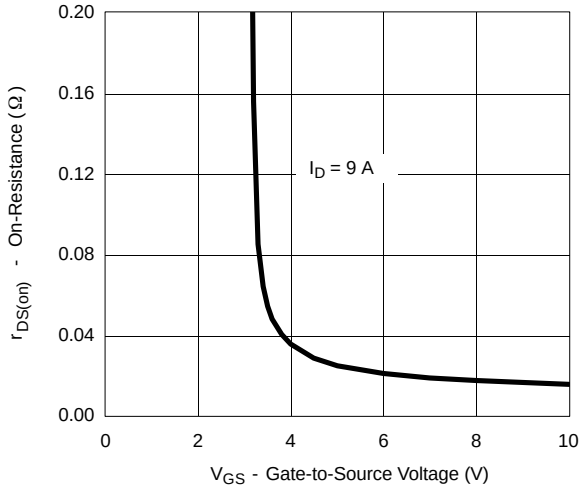


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET

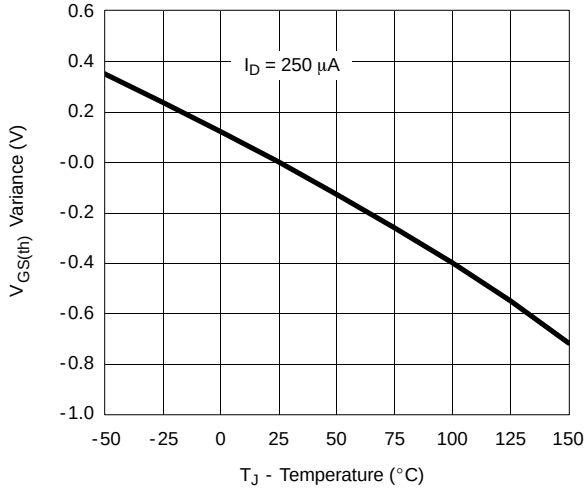
Source-Drain Diode Forward Voltage



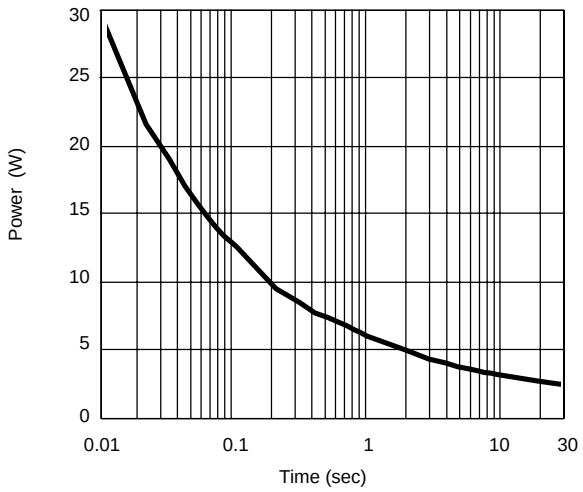
On-Resistance vs. Gate-to-Source Voltage



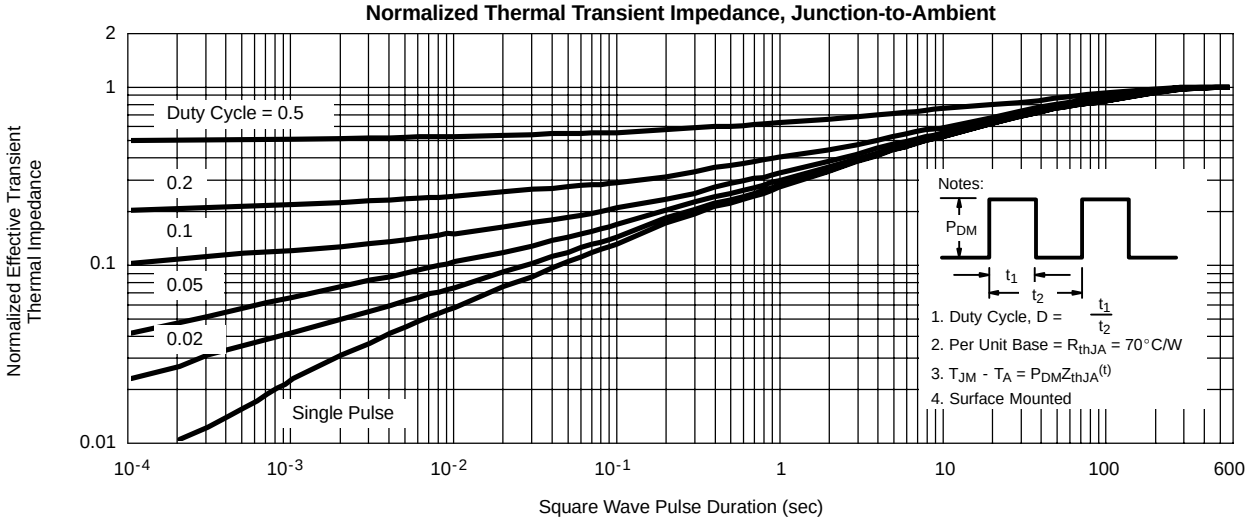
Threshold Voltage



Single Pulse Power

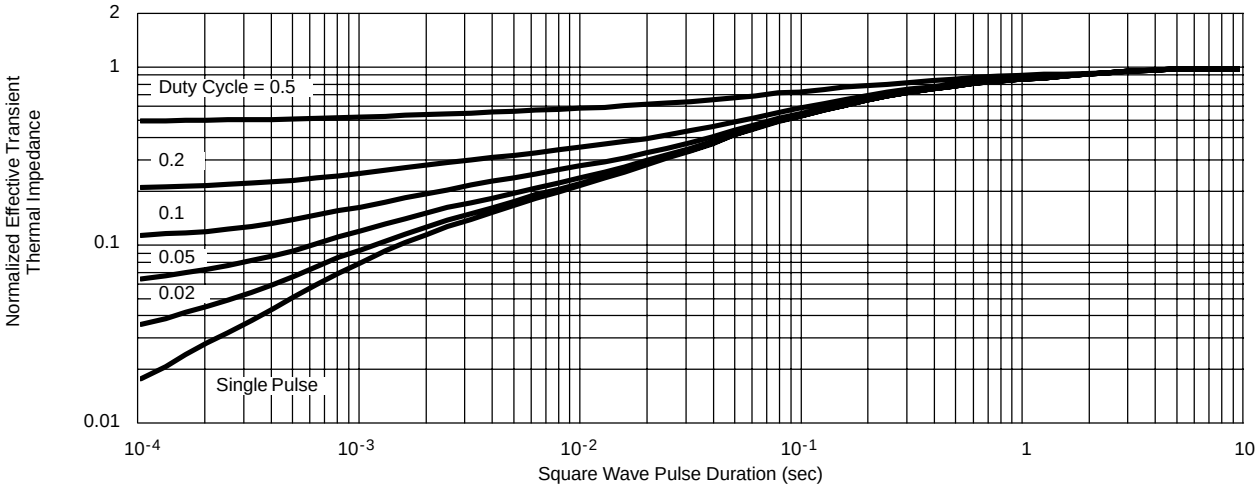


Normalized Thermal Transient Impedance, Junction-to-Ambient



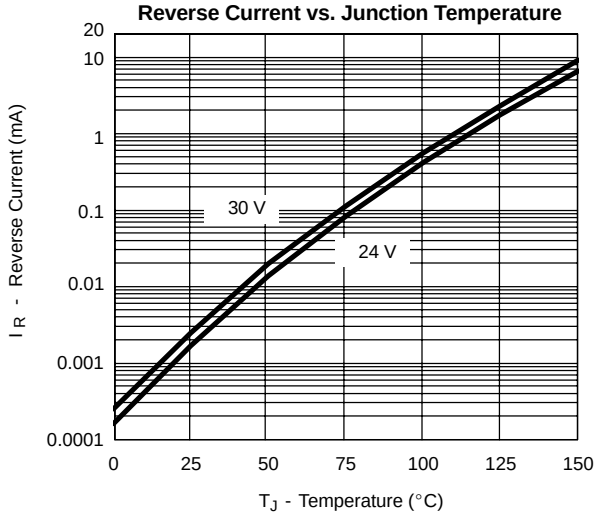
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET

Normalized Thermal Transient Impedance, Junction-to-Foot

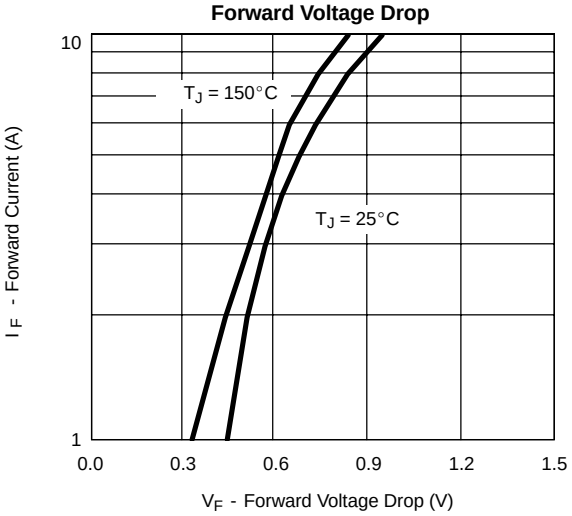


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY

Reverse Current vs. Junction Temperature



Forward Voltage Drop



Capacitance