Dual N-Channel 20-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY			
	V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
Channel-1	20	0.012 @ V_{GS} = 10 V	9.6
		0.0175 @ V_{GS} = 4.5 V	7.8
Channel-2		0.010 @ V_{GS} = 10 V	13.5
		0.0115 @ V_{GS} = 4.5 V	12.8

SCHOTTKY PRODUCT SUMMARY		
V_{DS} (V)	V_{SD} (V) Diode Forward Voltage	I_F (A)
20	0.53 V @ 3 A	2.0

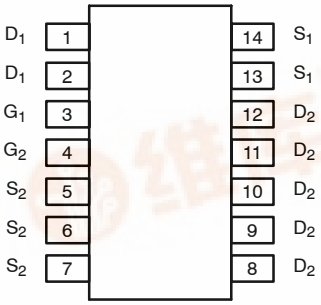
FEATURES

- TrenchFET® Power MOSFET
- 100% R_g Tested

APPLICATIONS

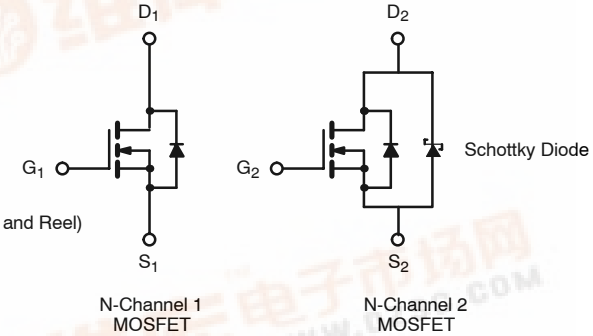
- DC/DC Converters
  - Game Stations
  - Notebook PC Logic

SO-14



Top View

Ordering Information: Si4340DY
Si4340DY-T1 (with Tape and Reel)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)							
Parameter		Symbol	Channel-1		Channel-2		Unit
			10 secs	Steady State	10 secs	Steady State	
Drain-Source Voltage		V_{DS}	20				V
Gate-Source Voltage		V_{GS}	±20		±16		
Continuous Drain Current (T_J = 150°C)[a]	T_A = 25°C	I_D	9.6	7.3	13.5	9.5	A
	T_A = 70°C		7.7	5.8	10.8	7.5	
Pulsed Drain Current		I_{DM}	40		50		
Continuous Source Current (Diode Conduction)[a]		I_S	1.8	1.04	2.73	1.30	
Maximum Power Dissipation[a]	T_A = 25°C	P_D	2.0	1.14	3.0	1.43	W
	T_A = 70°C		1.28	0.73	1.9	0.91	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150				°C

THERMAL RESISTANCE RATINGS									
Parameter		Symbol	Channel-1		Channel-2		Schottky		Unit
			Typ	Max	Typ	Max	Typ	Max	
Maximum Junction-to-Ambient[a]	t ≤ 10 sec	R_{thJA}	53	62.5	35	42	40	48	°C/W
	Steady-State		92	110	72	87	76	93	
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	35	42	18	23	21	25	

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	Ch-1	0.8		2.00	V
			Ch-2	0.8		1.90	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V	Ch-1			100	nA
		V_{DS} = 0 V, V_{GS} = ±12 V	Ch-2			100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V	Ch-1			1	µA
			Ch-2			100	
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 85°C	Ch-1			15	
			Ch-2			4000	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	Ch-1	20			A
			Ch-2	30			
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 9.6 A	Ch-1		0.0095	0.012	Ω
		V_{GS} = 10 V, I_D = 13.5 A	Ch-2		0.007	0.010	
		V_{GS} = 4.5 V, I_D = 7.8 A	Ch-1		0.0135	0.0175	
		V_{GS} = 4.5 V, I_D = 12.8 A	Ch-2		0.0085	0.0115	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 9.6 A	Ch-1		25		S
		V_{DS} = 15 V, I_D = 13.5 A	Ch-2		38		
Diode Forward Voltage[b]	V_{SD}	I_S = 1.8 A, V_{GS} = 0 V	Ch-1		0.74	1.1	V
		I_S = 2.73 A, V_{GS} = 0 V	Ch-2		0.485	0.53	
Dynamic[a]							
Total Gate Charge	Q_g	Channel-1 V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 9.6 A Channel-2 V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = -13.5 A	Ch-1		10	15	nC
			Ch-2		17	25	
Gate-Source Charge	Q_{gs}		Ch-1		3.3		
			Ch-2		4.5		
Gate-Drain Charge	Q_{gd}		Ch-1		3.1		
			Ch-2		4.5		
Gate Resistance	R_g	f = 1 MHz	Ch-1	0.45	0.9	1.35	Ω
			Ch-2	0.7	1.4	2.1	
Turn-On Delay Time	$t_{d(on)}$	Channel-1 V_{DD} = 01 V, R_L = 10 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_G = 6 Ω Channel-2 V_{DD} = 01 V, R_L = 15 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_G = 6 Ω	Ch-1		15	25	ns
			Ch-2		24	35	
Rise Time	t_r		Ch-1		16	25	
			Ch-2		22	35	
Turn-Off Delay Time	$t_{d(off)}$		Ch-1		42	65	
			Ch-2		68	100	
Fall Time	t_f		Ch-1		16	25	
			Ch-2		19	30	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.8 A, di/dt = 100 A/µs	Ch-1		35	60	
		I_F = 2.73 A, di/dt = 100 µA/µs	Ch-2		38	65	

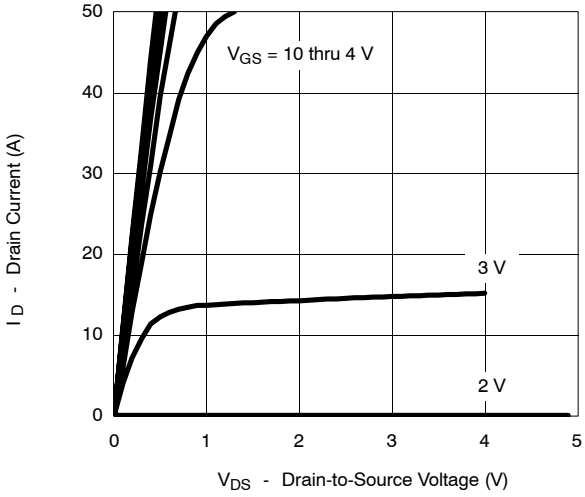
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.

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

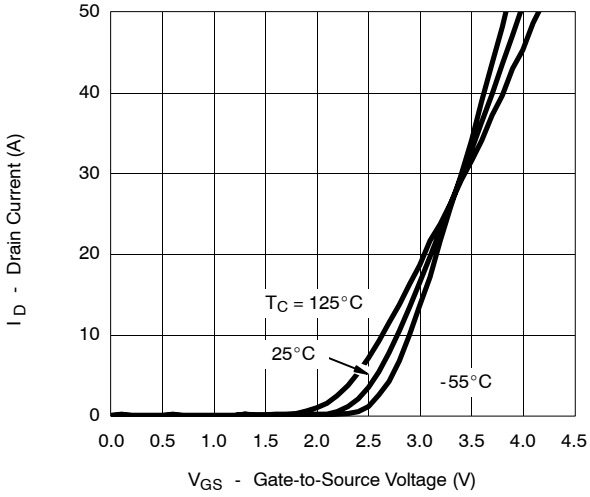
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V_F	I_F = 3 A		0.485	0.53	V
		I_F = 3 A, T_J = 125°C		0.42	0.42	
Maximum Reverse Leakage Current	I_{rm}	V_r = 20 V		0.008	0.100	mA
		V_r = 20 V, T_J = 75°C		0.4	5	
		V_r = -20 V, T_J = 125°C		6.5	20	
Junction Capacitance	C_T	V_r = 15 V		102		pF

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1

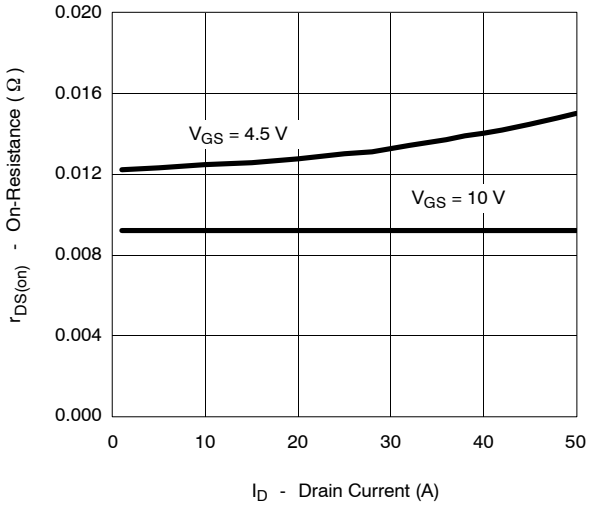
Output Characteristics



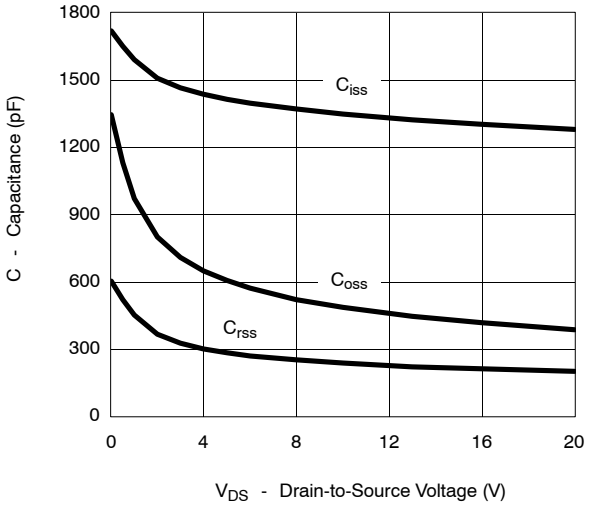
Transfer Characteristics



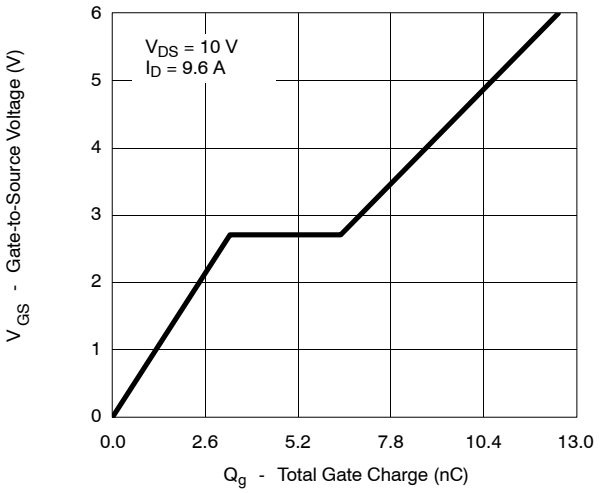
On-Resistance vs. Drain Current



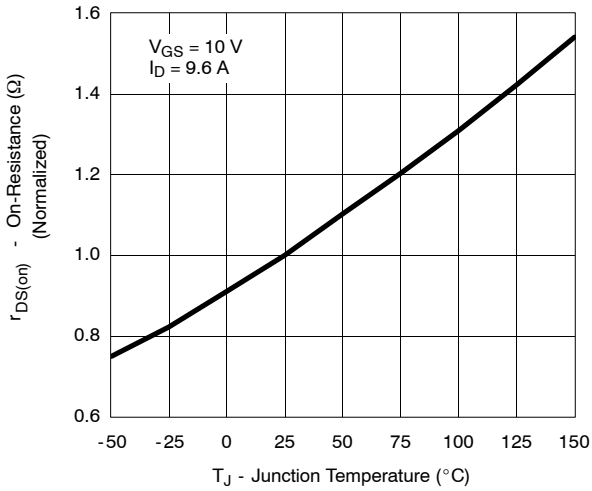
Capacitance



Gate Charge

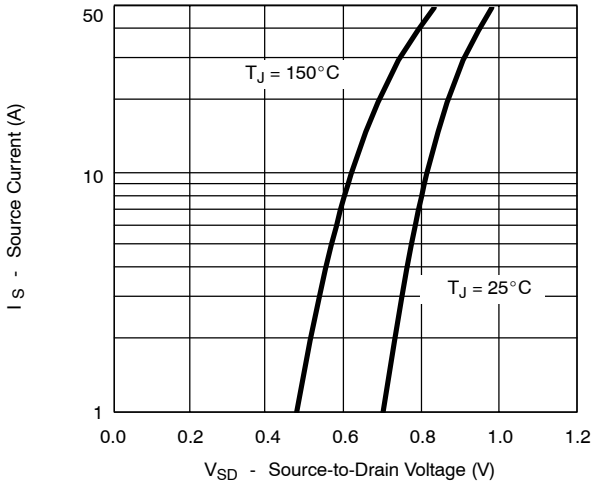


On-Resistance vs. Junction Temperature

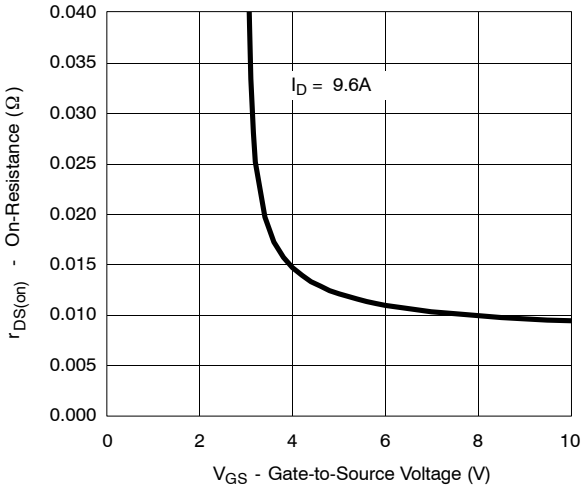


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1

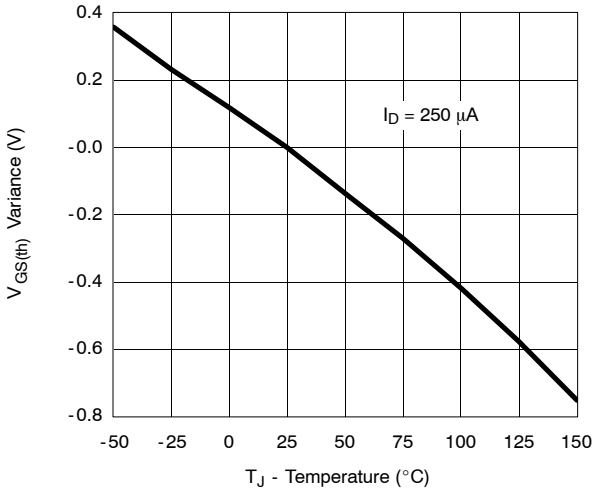
Source-Drain Diode Forward Voltage



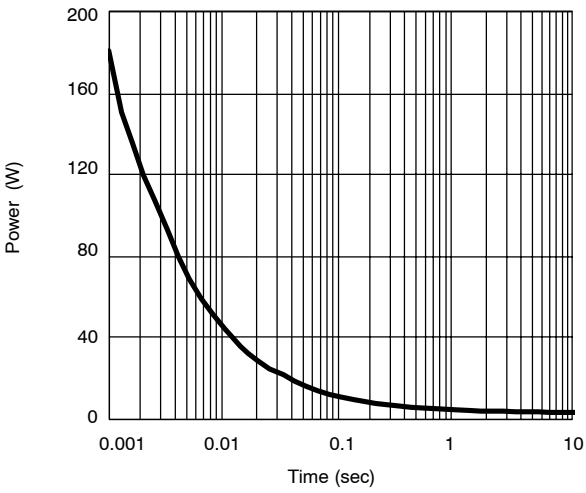
On-Resistance vs. Gate-to-Source Voltage



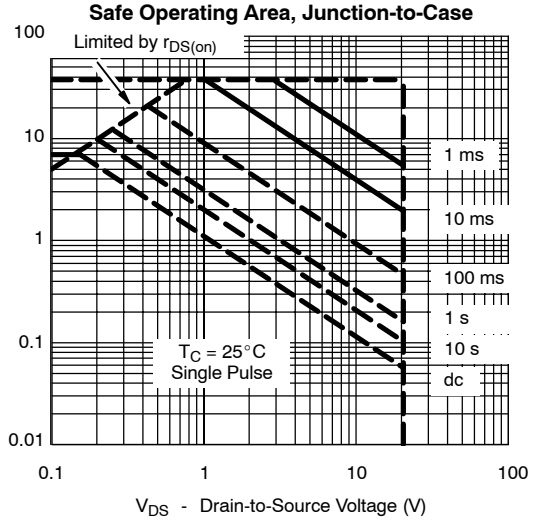
Threshold Voltage



Single Pulse Power

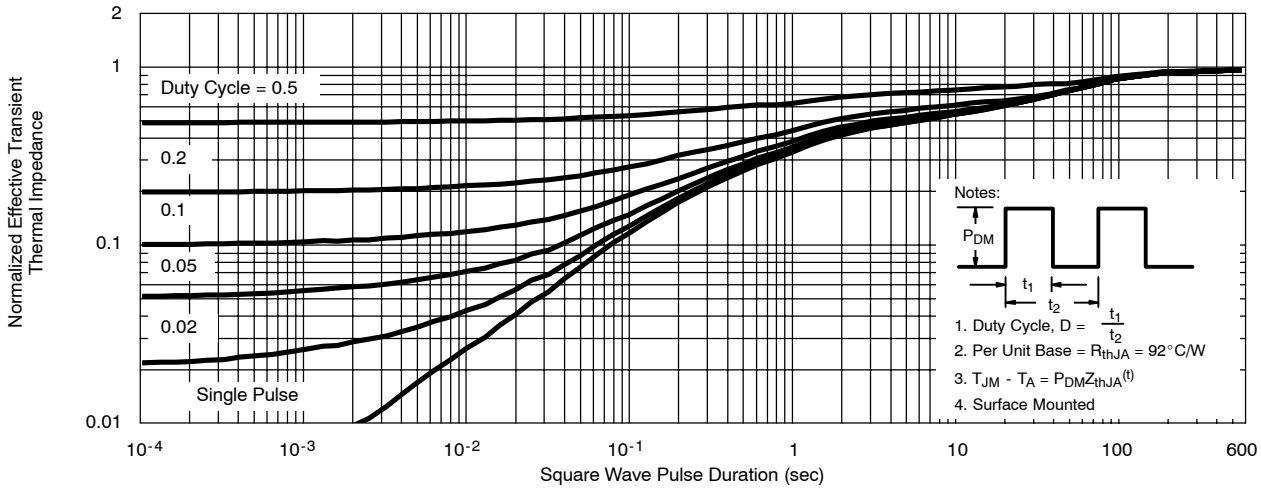


Safe Operating Area, Junction-to-Case

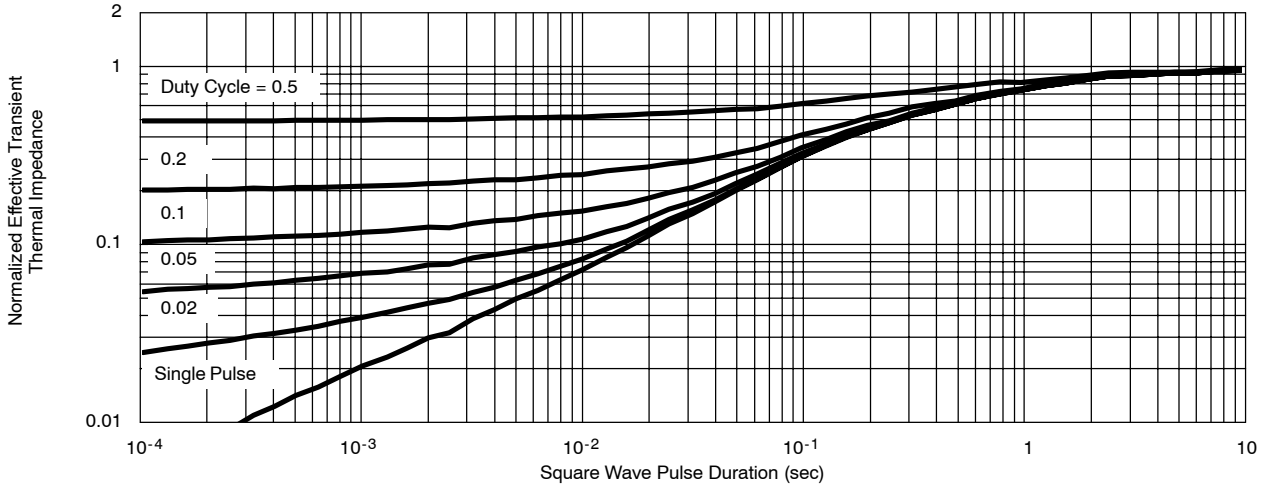


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1

Normalized Thermal Transient Impedance, Junction-to-Ambient

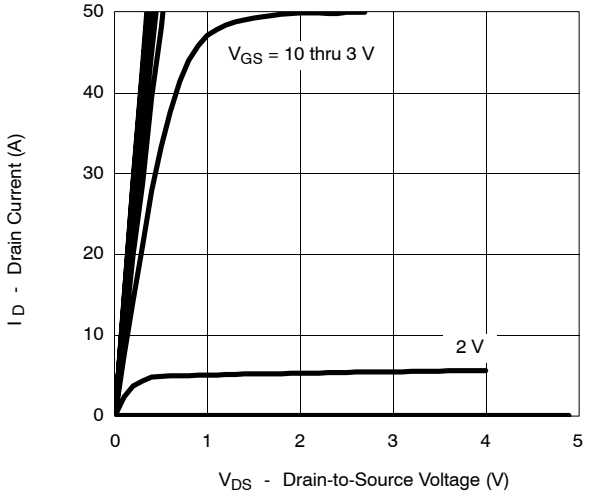


Normalized Thermal Transient Impedance, Junction-to-Foot

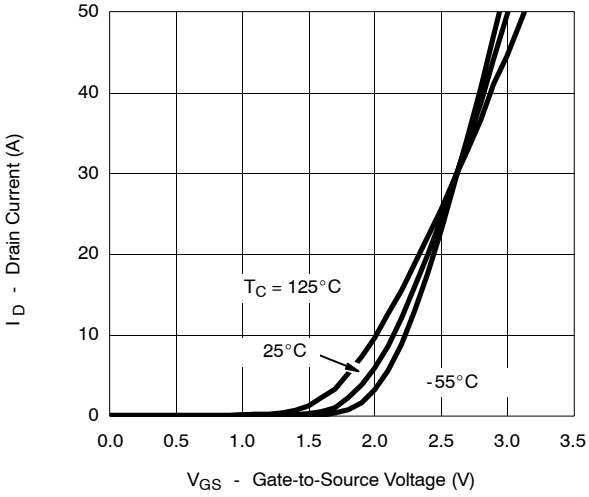


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

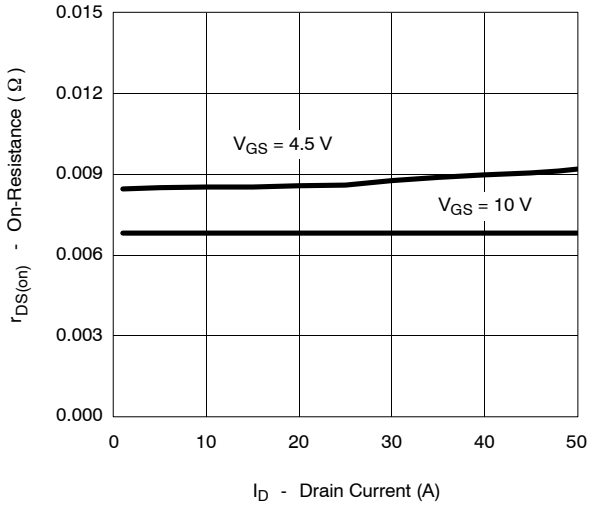
Output Characteristics



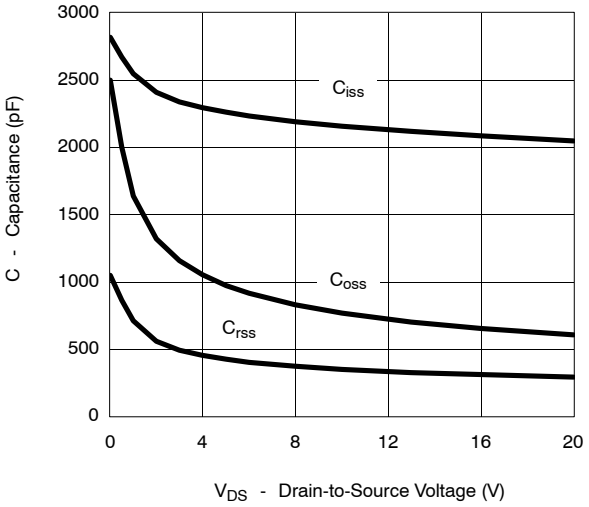
Transfer Characteristics



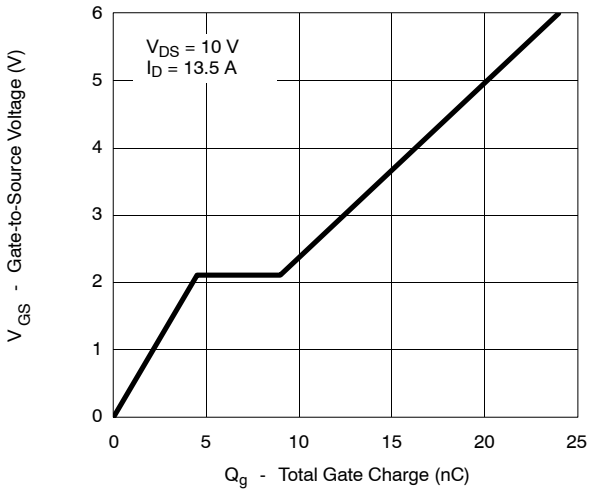
On-Resistance vs. Drain Current



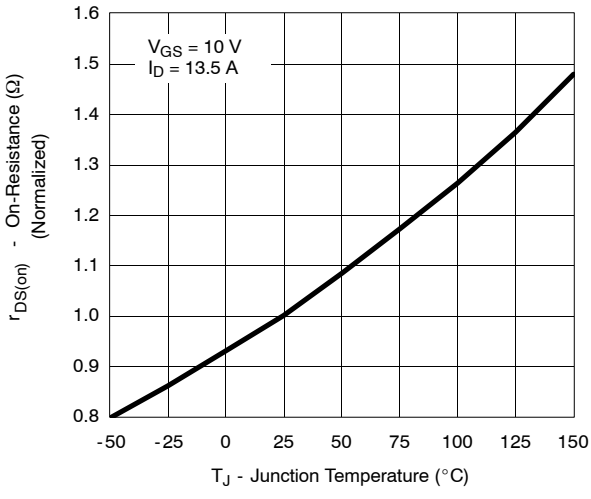
Capacitance



Gate Charge

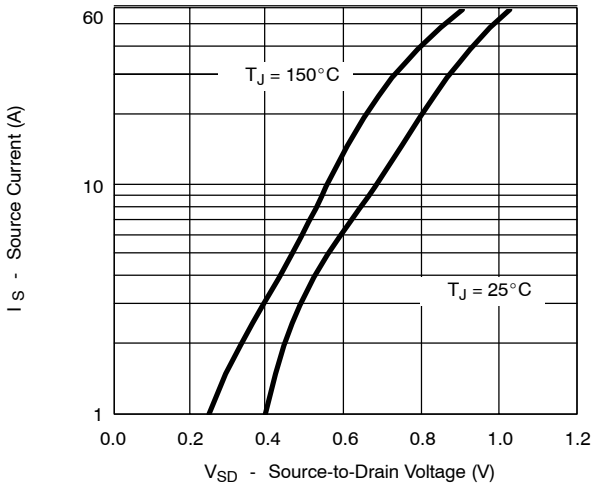


On-Resistance vs. Junction Temperature

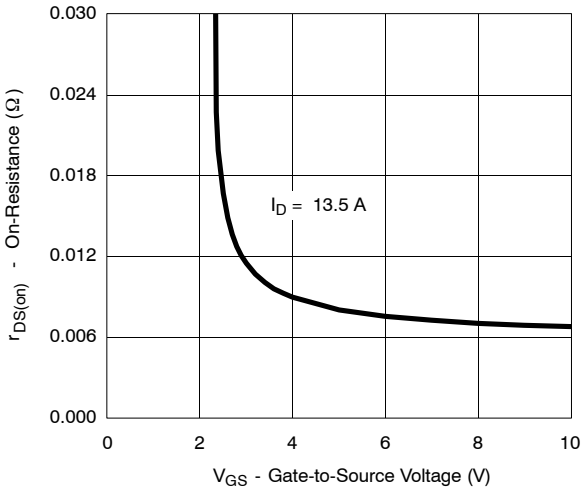


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

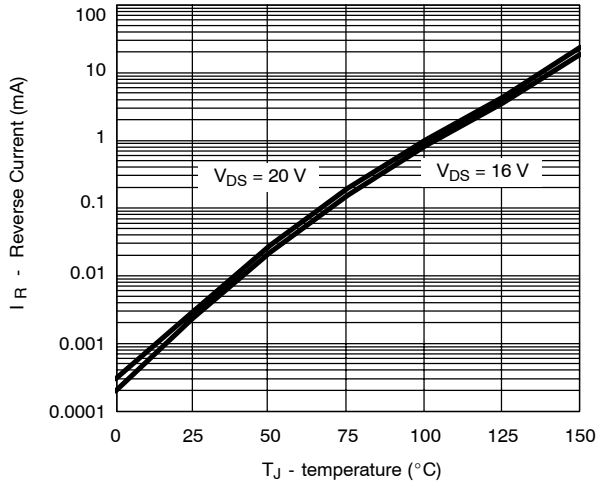
Source-Drain Diode Forward Voltage



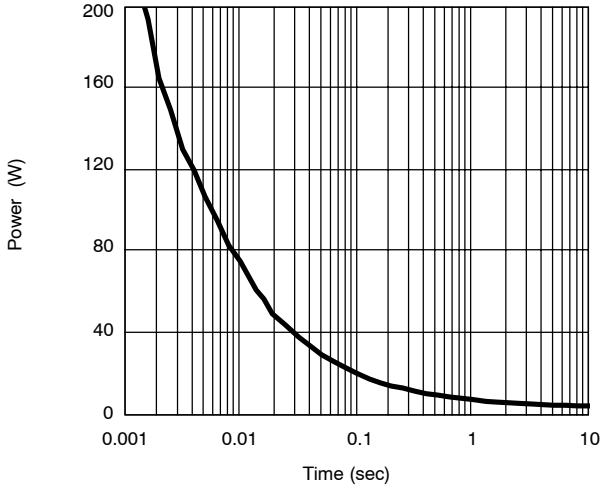
On-Resistance vs. Gate-to-Source Voltage



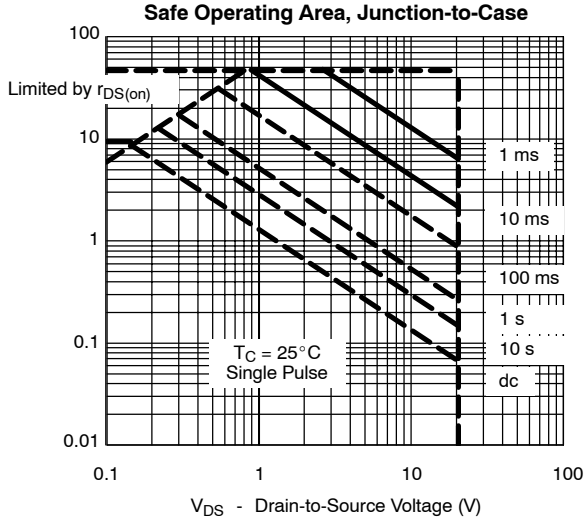
Reverse Current vs. Junction Temperature



Single Pulse Power

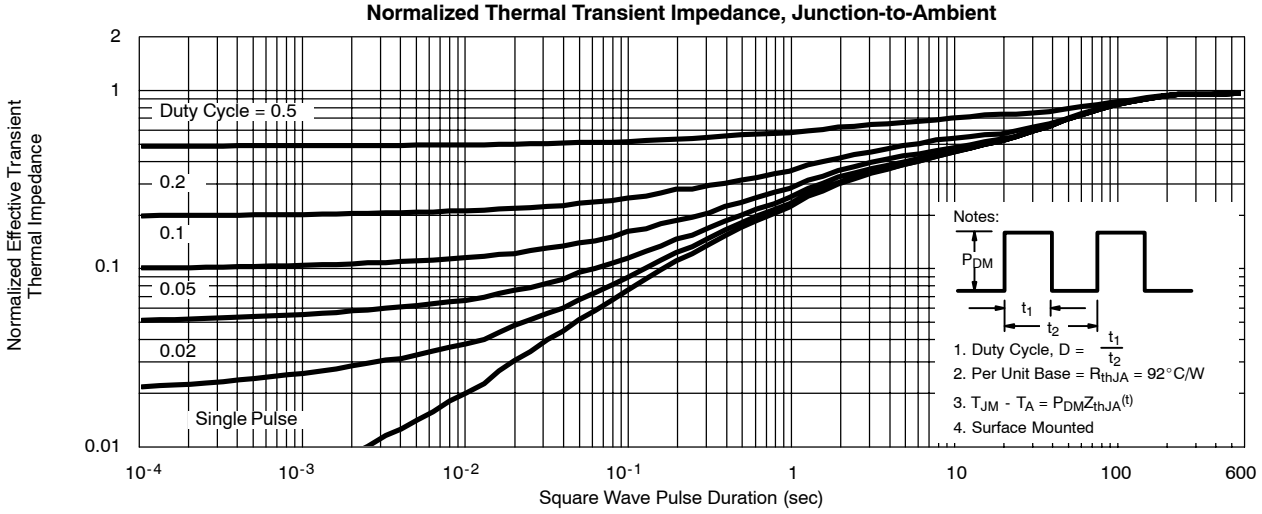


Safe Operating Area, Junction-to-Case

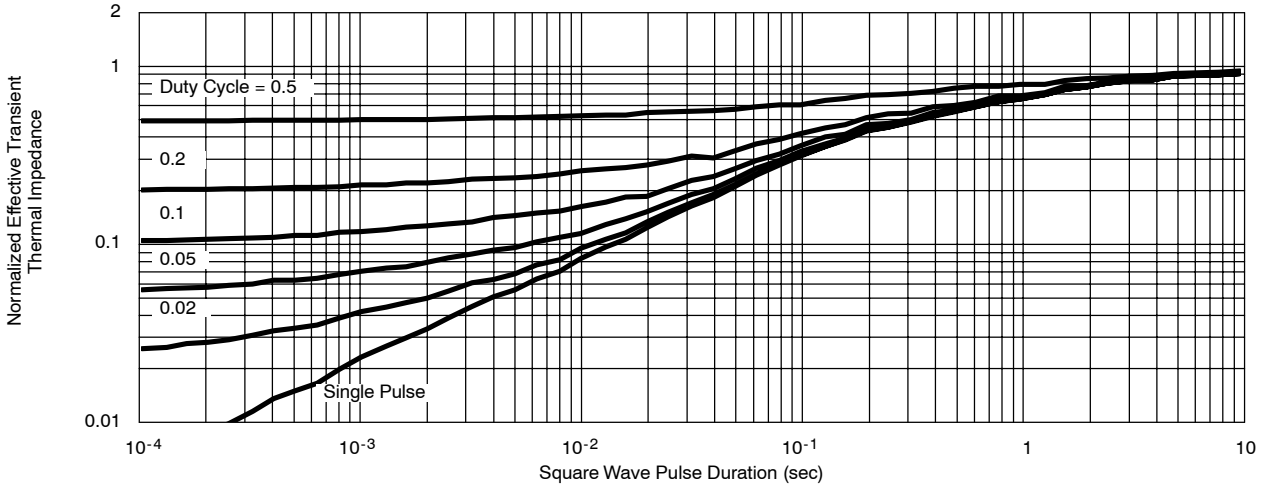


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

Normalized Thermal Transient Impedance, Junction-to-Ambient

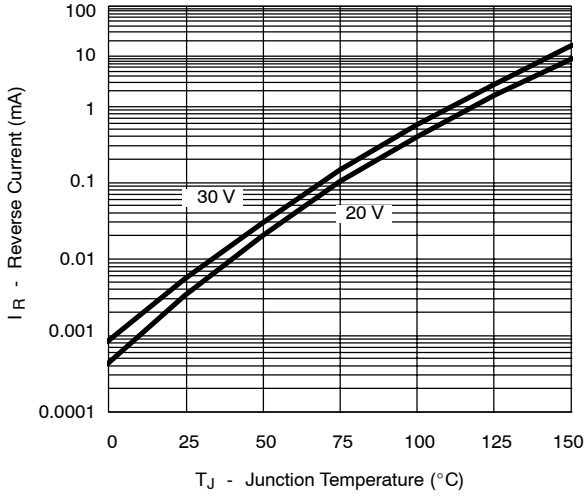


Normalized Thermal Transient Impedance, Junction-to-Foot

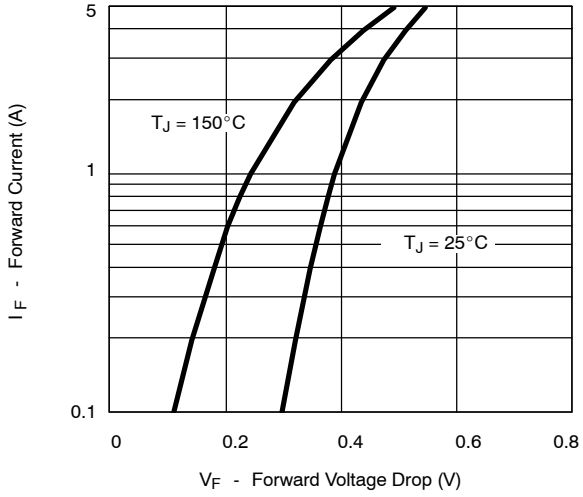


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY

Reverse Current vs. Junction Temperature

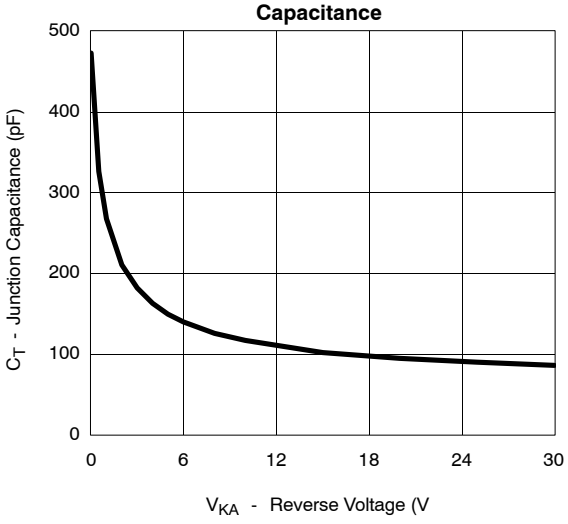


Forward Voltage Drop

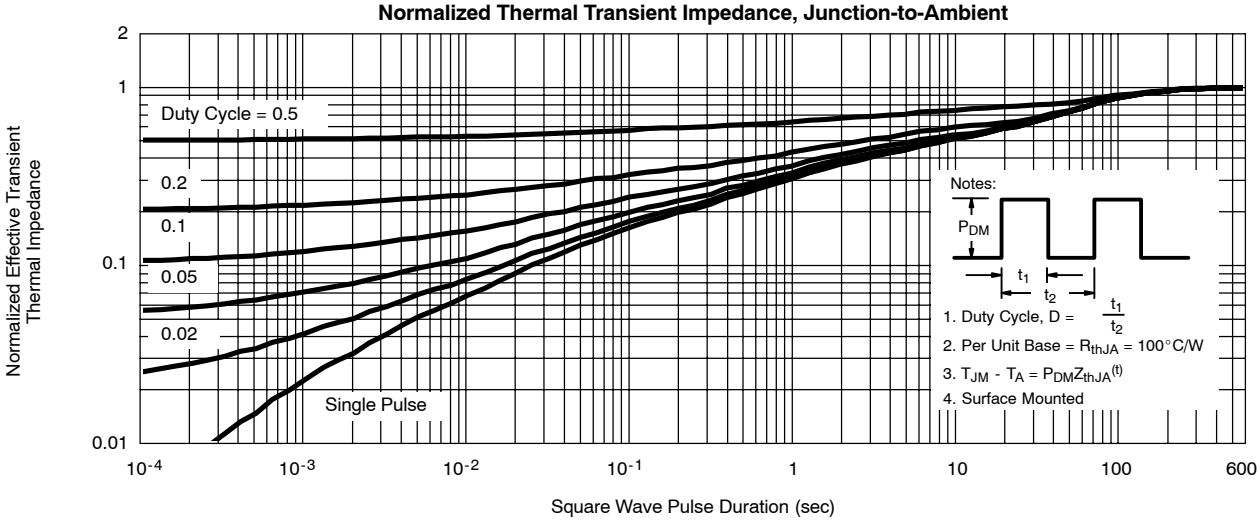


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY

Capacitance



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot