Dual N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.019 @ V_{GS} = 10 V	10.2
	0.026 @ V_{GS} = 4.5 V	8.7

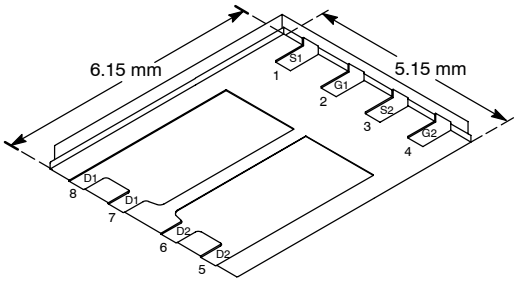
FEATURES

- TrenchFET® Power MOSFET
- New Low Thermal Resistance PowerPAK® Package
- Dual MOSFET for Space Savings
- 100% R_g Tested

APPLICATIONS

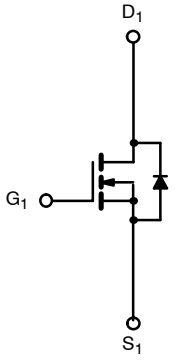
- Primary Side Switch
  - Low Power Quarter Buck
- Intermediate BUS Switch

PowerPAK SO-8

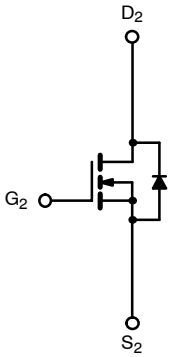


Bottom View

Ordering Information: Si7970DP-T1—E3



N-Channel MOSFET



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)					
Parameter		Symbol	10 secs	Steady State	Unit
Drain-Source Voltage		V_{DS}	40		V
Gate-Source Voltage		V_{GS}	±20		
Continuous Drain Current (T_J = 150°C)[a]	T_A = 25°C	I_D	10.2	6.5	A
	T_A = 70°C		8.2	5.2	
Pulsed Drain Current		I_{DM}	40		
Continuous Source Current (Diode Conduction)[a]		I_S	2.9	1.2	
Single Avalanche Current	L = 0.1 mH	I_{AS}	30		
Single Avalanche Energy		E_{AS}	45		mJ
Maximum Power Dissipation[a]	T_A = 25°C	P_D	3.5	1.4	W
	T_A = 70°C		2.2	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]	t ≤ 10 sec	R_{thJA}	26	35	°C/W
	Steady State		60	85	
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	2.2	2.7	

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

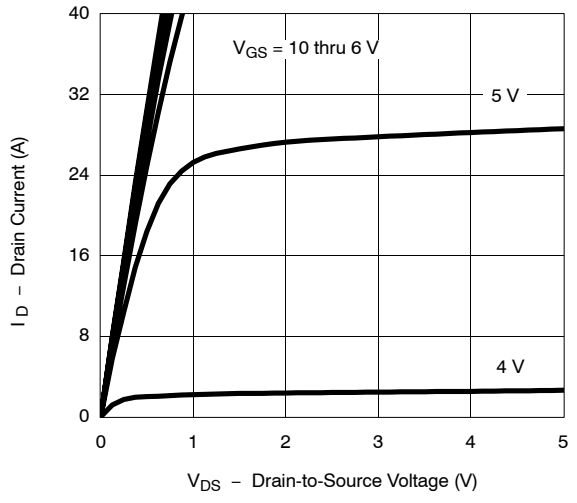
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1		3	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} = 40 V, V_{GS} = 0 V			1	μA
		V_{DS} = 40 V, V_{GS} = 0 V, T_J = 55°C			5	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	30			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 10.2 A		0.016	0.019	Ω
		V_{GS} = 4.5 V, I_D = 8.7 A		0.021	0.026	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 10.2 A		26		S
Diode Forward Voltage[a]	V_{SD}	I_S = 2.9 A, V_{GS} = 0 V		0.8	1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} =20 V, V_{GS} = 10 V, I_D = 10.2 A		23	35	nC
Gate-Source Charge	Q_{gs}			4.4		
Gate-Drain Charge	Q_{gd}			5.6		
Gate Resistance	R_g	f = 1 MHz	1	2.3	3.9	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20 V, R_L = 20 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_g = 6 Ω		15	25	ns
Rise Time	t_r			15	25	
Turn-Off Delay Time	$t_{d(off)}$			50	75	
Fall Time	t_f			16	25	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 2.9 A, di/dt = 100 A/μs		30	60	

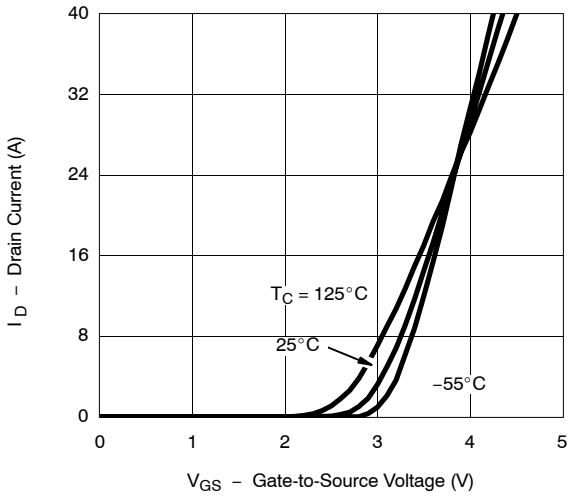
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

Output Characteristics

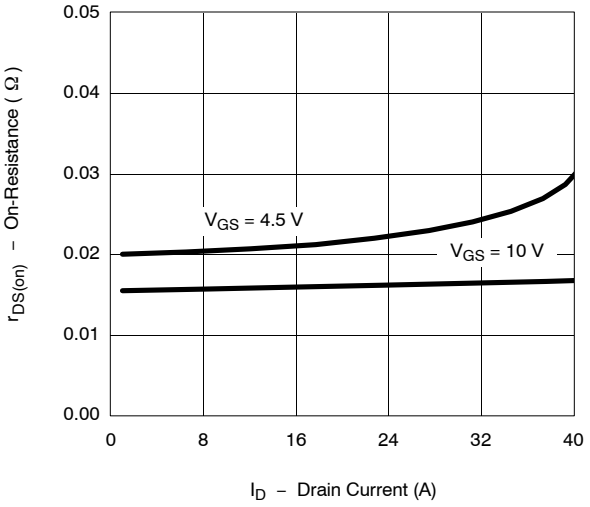


Transfer Characteristics

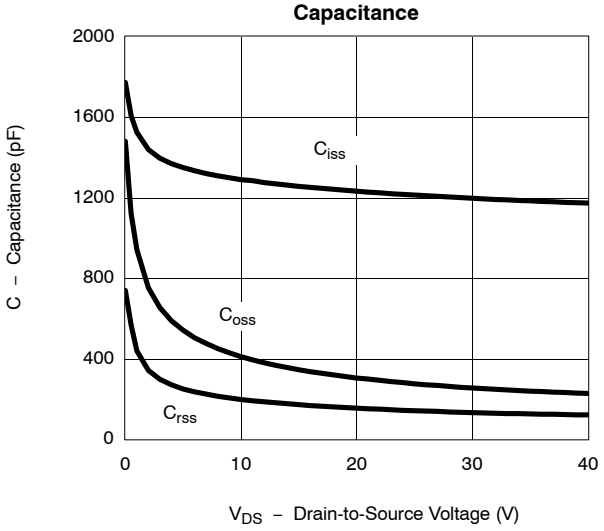


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

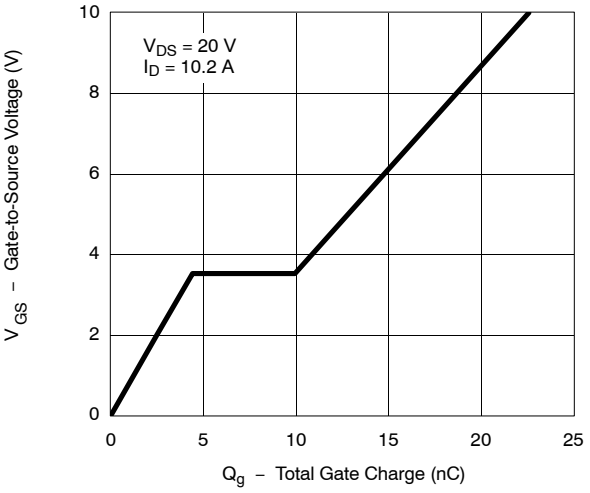
On-Resistance vs. Drain Current



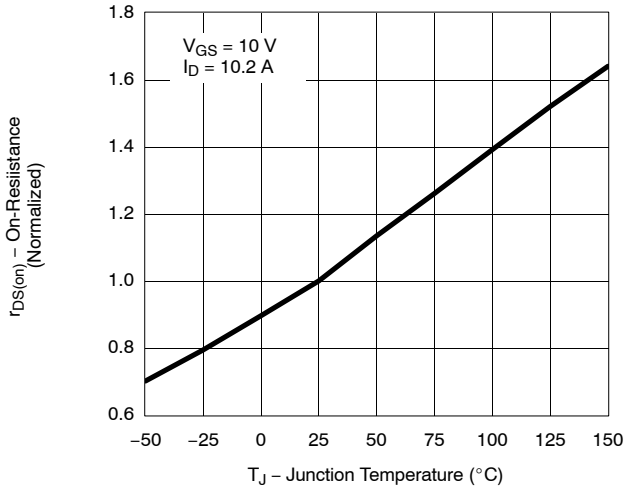
Capacitance



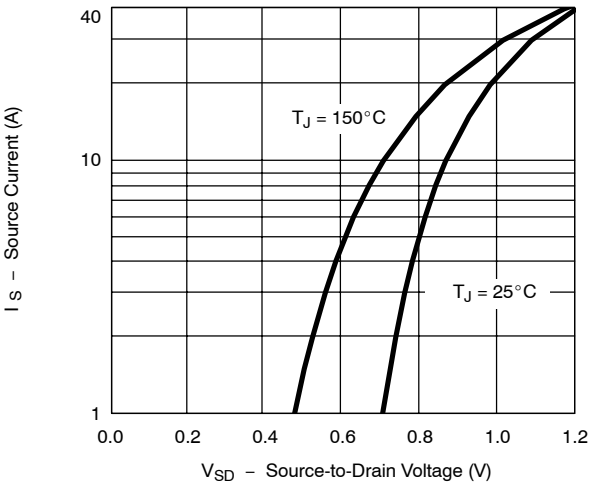
Gate Charge



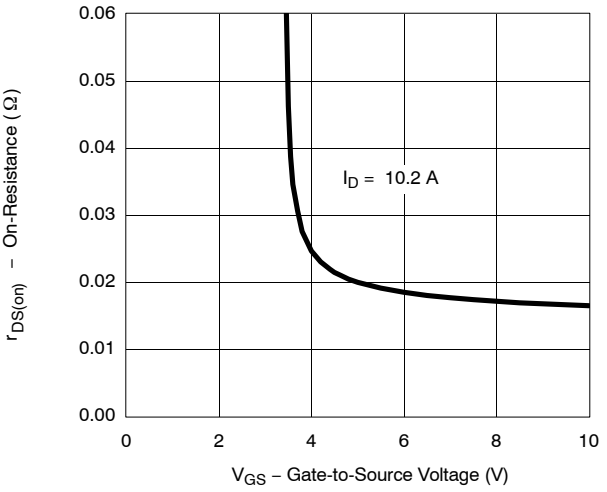
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

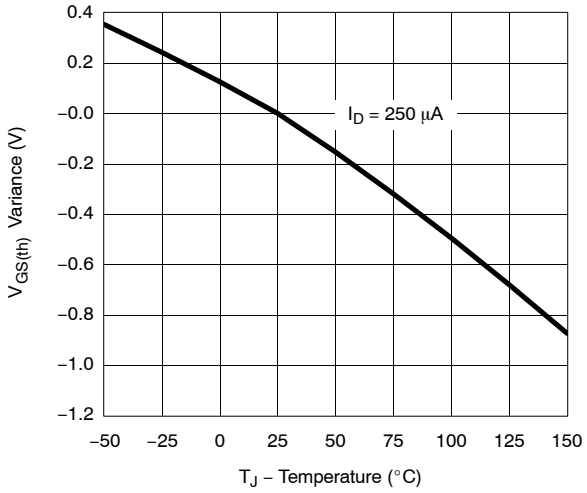


On-Resistance vs. Gate-to-Source Voltage

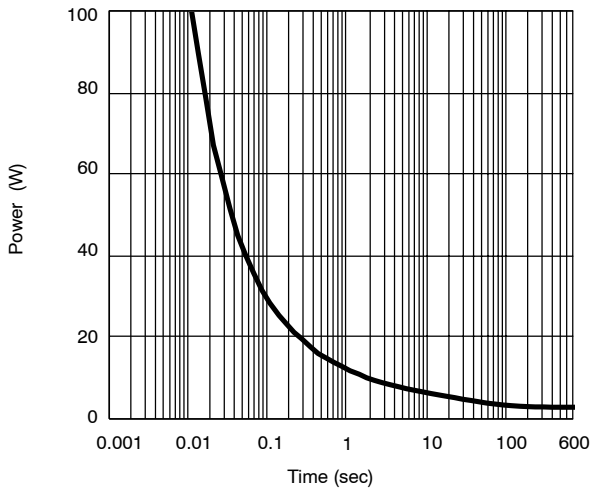


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

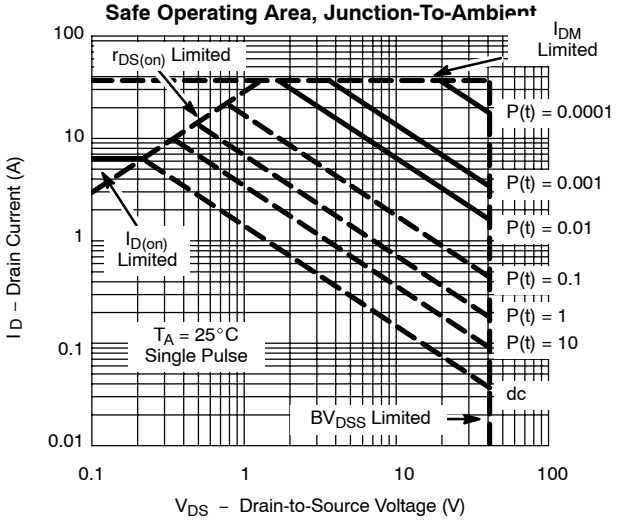
Threshold Voltage



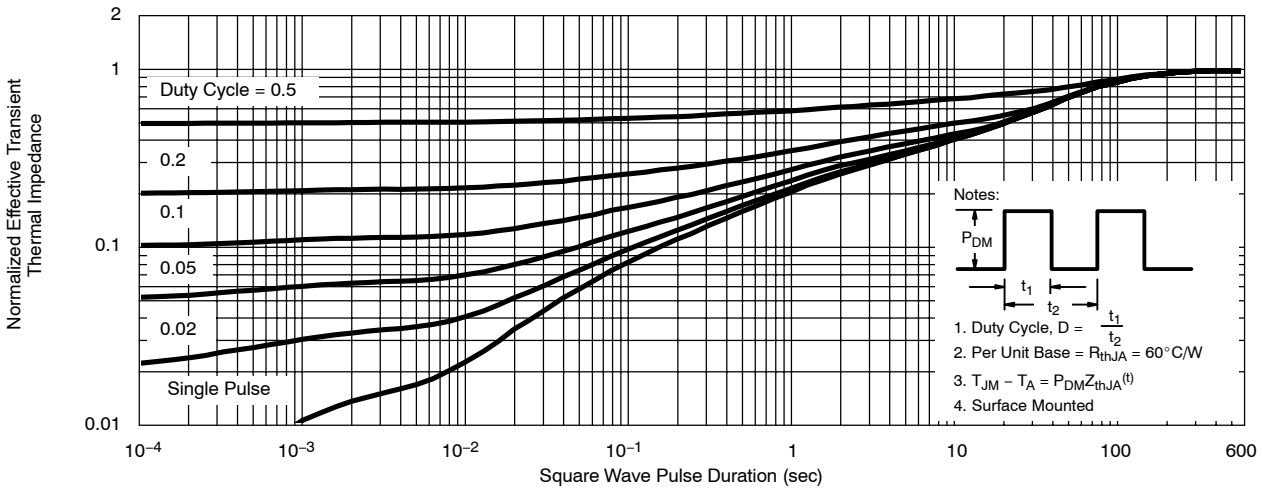
Single Pulse Power



Safe Operating Area, Junction-To-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

Normalized Thermal Transient Impedance, Junction-to-Case