N-Channel 40-V (D-S) 175°C MOSFET

PRODUCT SUMMARY			
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ)
40	0.0053 @ V_{GS} = 10 V	110	95

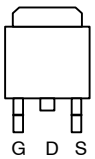
FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- High Threshold At High Temperature

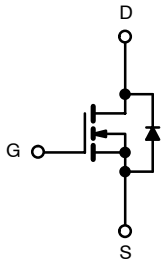
APPLICATIONS

- Automotive Such As:
  - High-Side Switch
  - Motor Drives
  - 12-V Battery

TO-263



Top View



N-Channel MOSFET

Ordering Information: SUM110N04-05H—E3

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	20	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	110	A
	T_C = 125°C		70	
Pulsed Drain Current		I_{DM}	300	
Avalanche Current		I_{AR}	50	
Repetitive Avalanche Energy[a]	L = 0.1 mH	E_{AR}	125	mJ
Maximum Power Dissipation[a]	T_C = 25°C	P_D	150[b]	W
	T_A = 25°C [c]		3.75	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount)[c]	R_{thJA}	40	°C/W
Junction-to-Case	R_{thJC}	1	

Notes
a. Duty cycle ≤ 1%.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

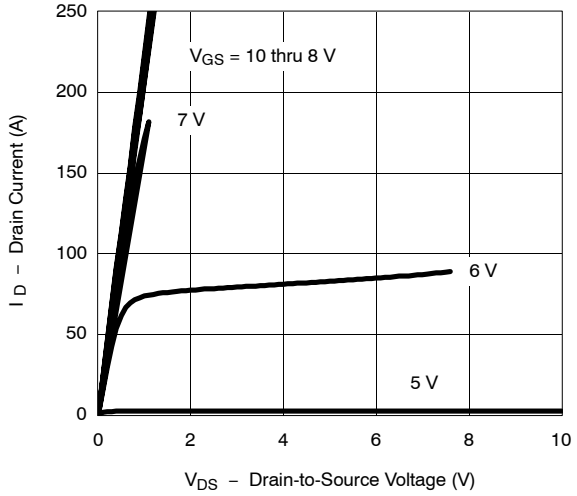
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 250 μA	3.4	3.8	5.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40 V, V_{GS} = 0 V			1	μA
		V_{DS} = 40 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 40 V, V_{GS} = 0 V, T_J = 175°C			250	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	120			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A		0.0044	0.0053	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125°C			0.008	
		V_{GS} = 10 V, I_D = 30 A, T_J = 175°C			0.0106	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 15 A	20	50		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		6700		pF
Output Capacitance	C_{oss}			600		
Reversen Transfer Capacitance	C_{rss}			320		
Total Gate Charge[c]	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 50 A		95		nC
Gate-Source Charge[c]	Q_{gs}			37		
Gate-Drain Charge[c]	Q_{gd}			21		
Gate Resistance	R_g	f = 1.0 MHz		1.7		Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 20 V, R_L = 0.4 Ω I_D ≃ 50 A, V_{GEN} = 10 V, R_g = 2.5 Ω		20	30	ns
Rise Time[c]	t_r			95	145	
Turn-Off Delay Time[c]	$t_{d(off)}$			50	75	
Fall Time[c]	t_f			12	20	
Source-Drain Ciode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_s				100	A
Pulsed Current	I_{SM}				300	
Forward Voltage[a]	V_{SD}	I_F = 30 A, V_{GS} = 0 V		0.90	1.50	V
Reverse Recovery Time	t_{rr}	I_F = 30 A, di/dt = 100 A/μs		40	60	ns

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

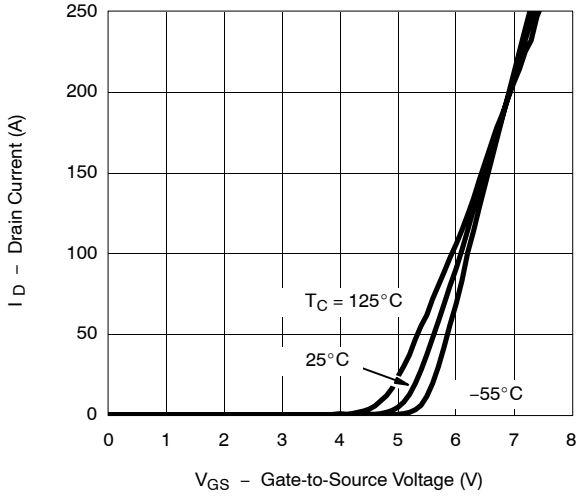
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

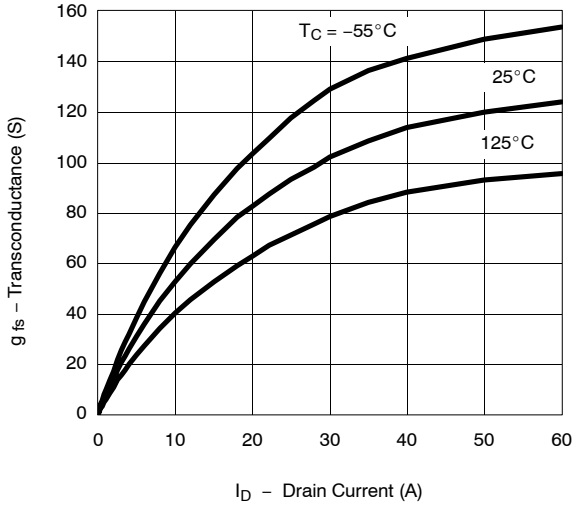
Output Characteristics



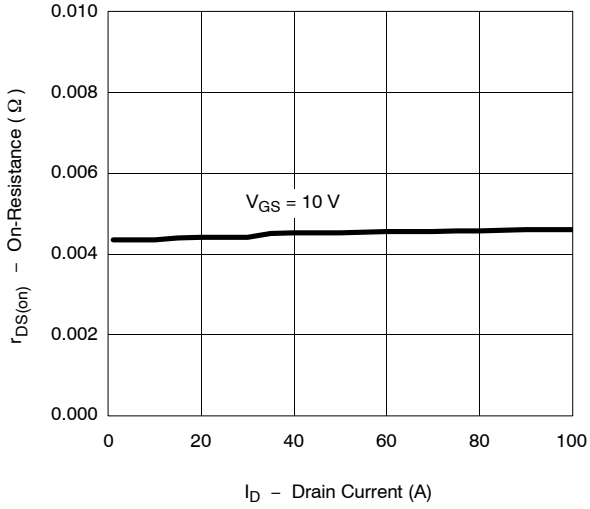
Transfer Characteristics



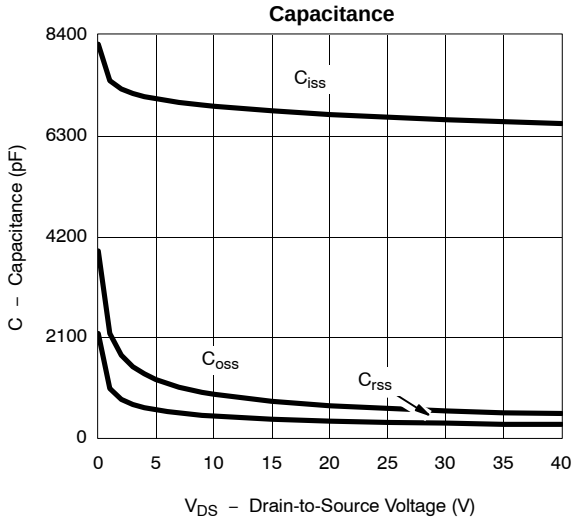
Transconductance



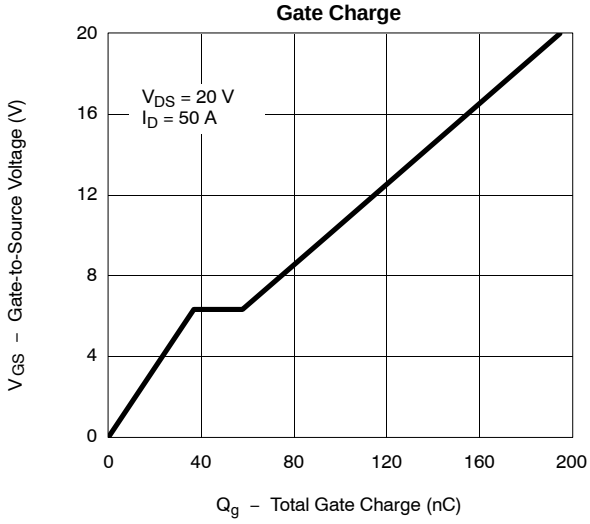
On-Resistance vs. Drain Current



Capacitance

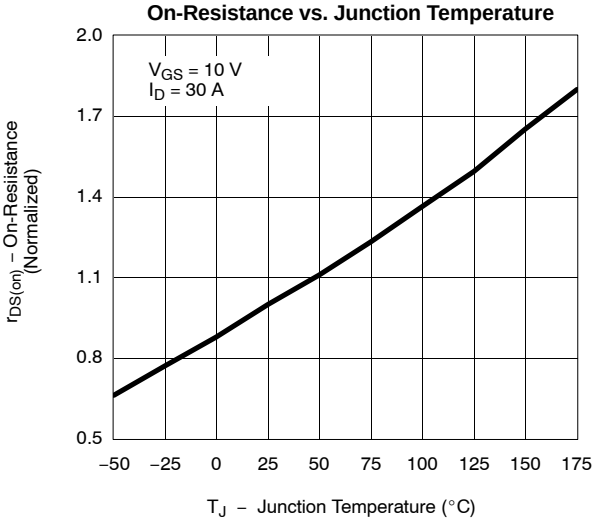


Gate Charge

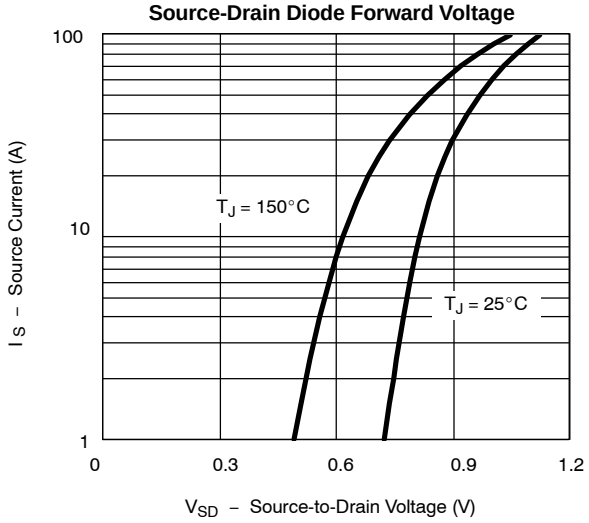


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

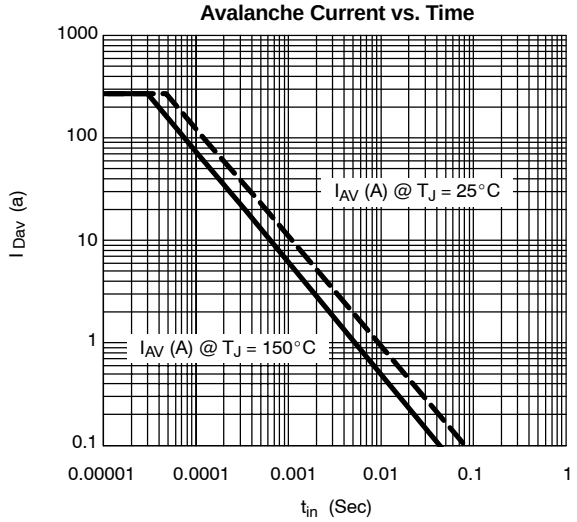
On-Resistance vs. Junction Temperature



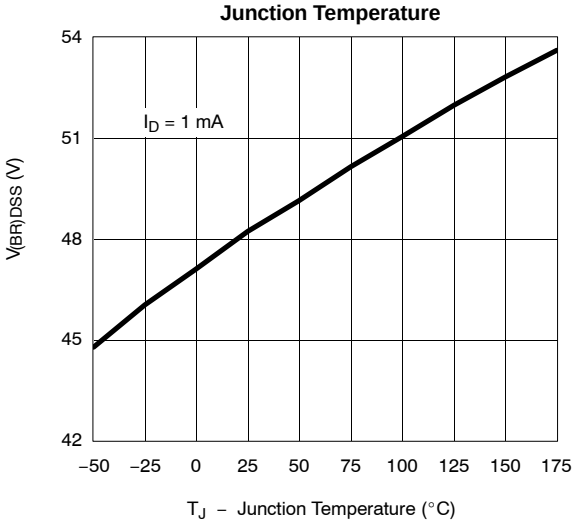
Source-Drain Diode Forward Voltage



Avalanche Current vs. Time

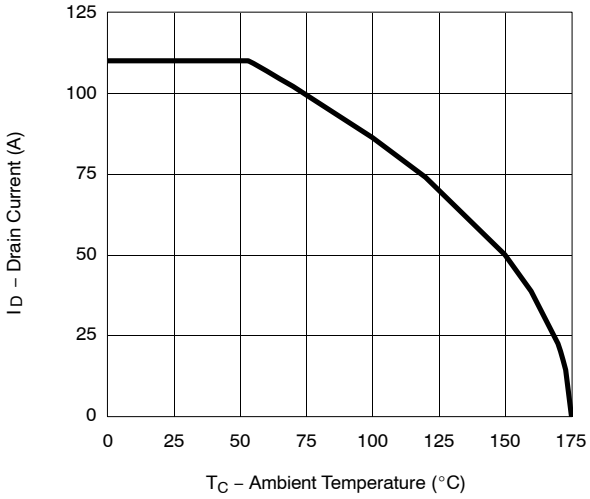


Drain Source Breakdown vs. Junction Temperature

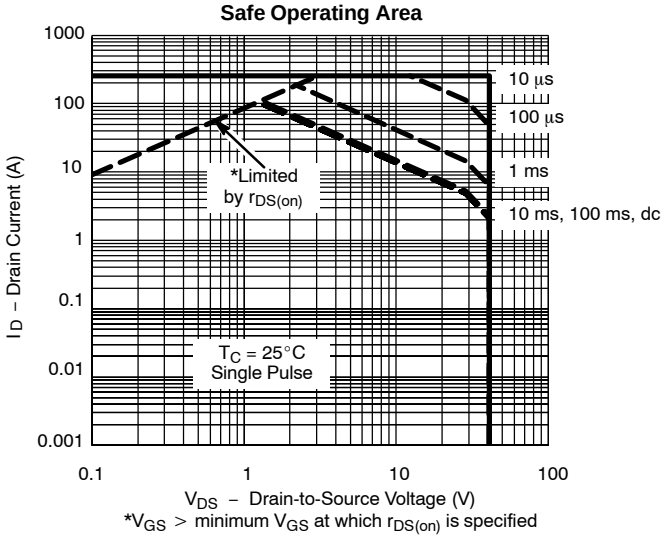


THERMAL RATINGS

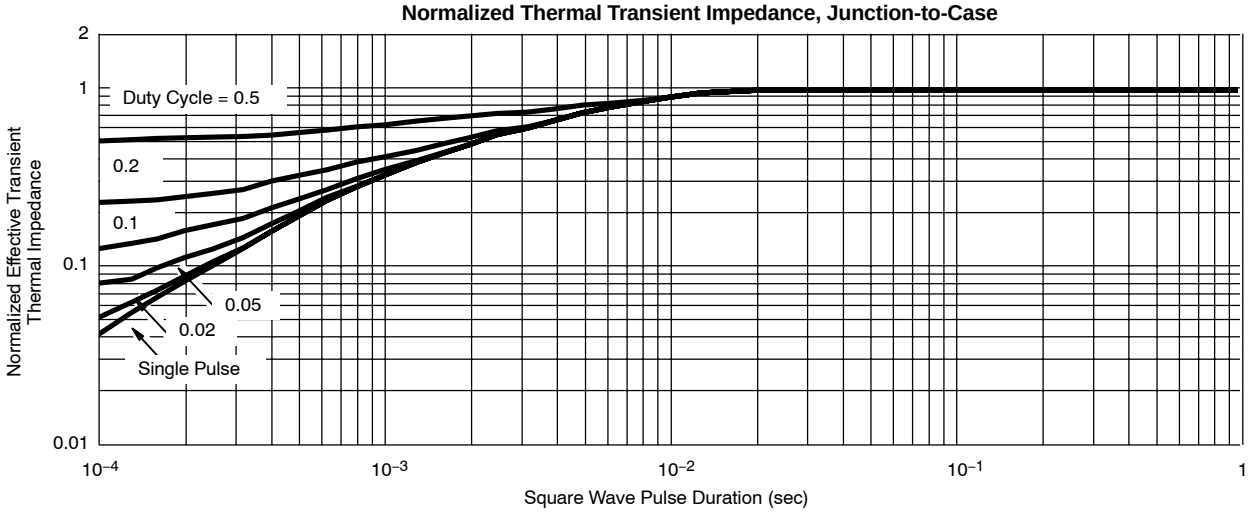
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



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