N-Channel 40-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.0035 @ V_{GS} = 10 V	110 [a]

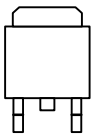
FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature

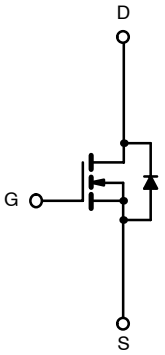
APPLICATIONS

- Automotive
  - ABS
  - 12-V EPS
  - Motor Drivers

TO-263



Top View



N-Channel MOSFET

Ordering Information: SUM110N04-04
SUM110N04-04—E3 (Lead Free)

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]	A
	T_C = 125°C		107[a]	
Pulsed Drain Current		I_{DM}	350	
Avalanche Current		I_{AR}	60	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	180	mJ
Maximum Power Dissipation[b]	T_C = 25°C	P_D	250[c]	W
	T_A = 25°C [d]		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)[d]	R_{thJA}	40	°C/W
Junction-to-Case	R_{thJC}	0.6	

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

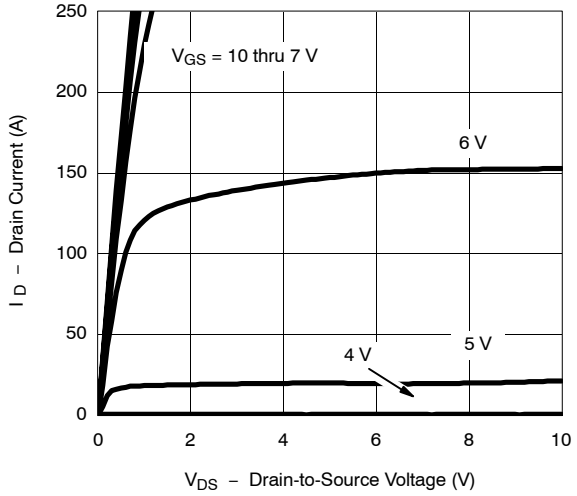
SPECIFICATIONS (T_J =25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{DS} = 0 V, I_D = 250 μA	40			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2		4	
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		0.0028	0.0035	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125°C			0.0055	
		V_{GS} = 10 V, I_D = 30 A, T_J = 175°C			0.006	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	30			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		6800		pF
Output Capacitance	C_{oss}			1110		
Reverse Transfer Capacitance	C_{rss}			690		
Total Gate Charge[c]	Q_g	V_{DS} = 30 V, V_{GS} = 10 V, I_D = 110 A		140	200	nC
Gate-Source Charge[c]	Q_{gs}			35		
Gate-Drain Charge[c]	Q_{gd}			55		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 30 V, R_L = 0.47 Ω I_D ≅ 110 A, V_{GEN} = 10 V, R_g = 2.5 Ω		20	35	ns
Rise Time[c]	t_r			115	175	
Turn-Off Delay Time[c]	$t_{d(off)}$			75	115	
Fall Time[c]	t_f			85	130	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_S				110	A
Pulsed Current	I_{SM}				350	
Forward Voltage[a]	V_{SD}	I_F = 110 A, V_{GS} = 0 V		1.1	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 110 A, di/dt = 100 A/μs		50	80	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			2	3	A
Reverse Recovery Charge	Q_{rr}			0.05	0.12	μC

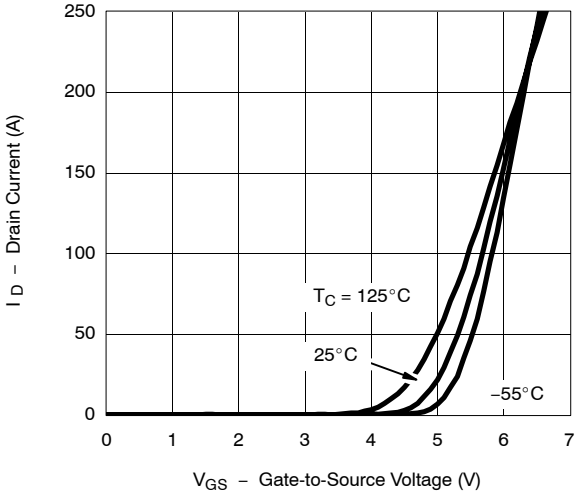
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

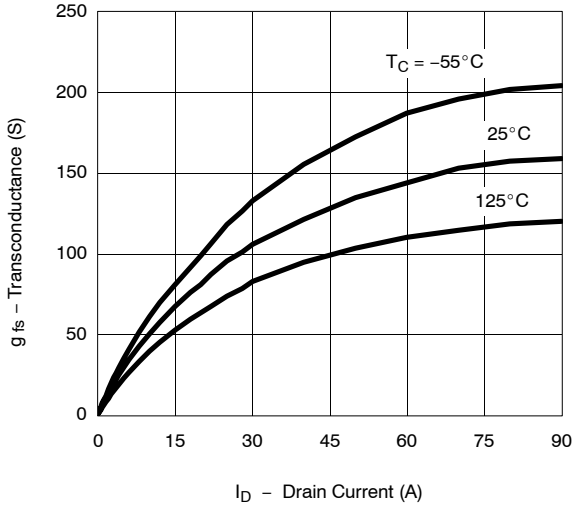
Output Characteristics



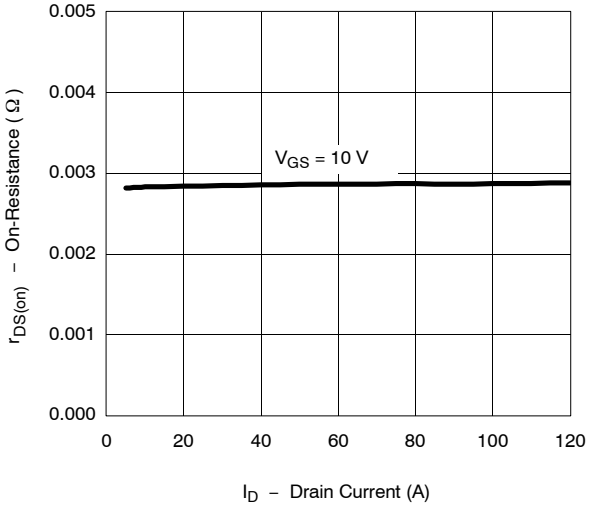
Transfer Characteristics



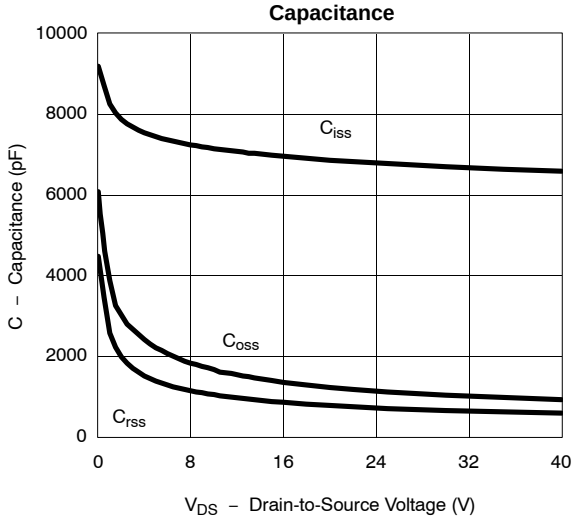
Transconductance



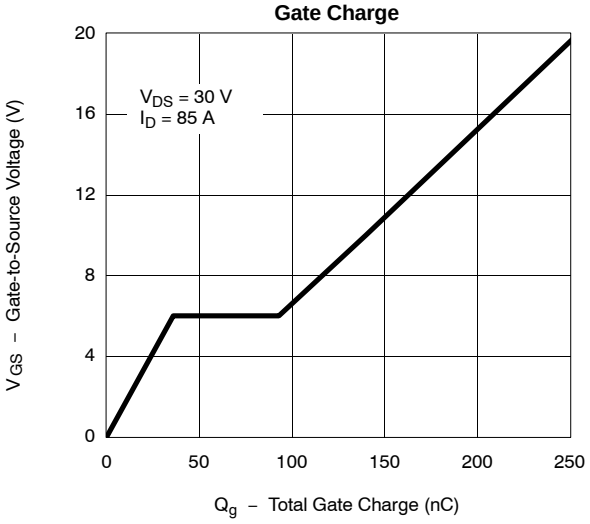
On-Resistance vs. Drain Current



Capacitance

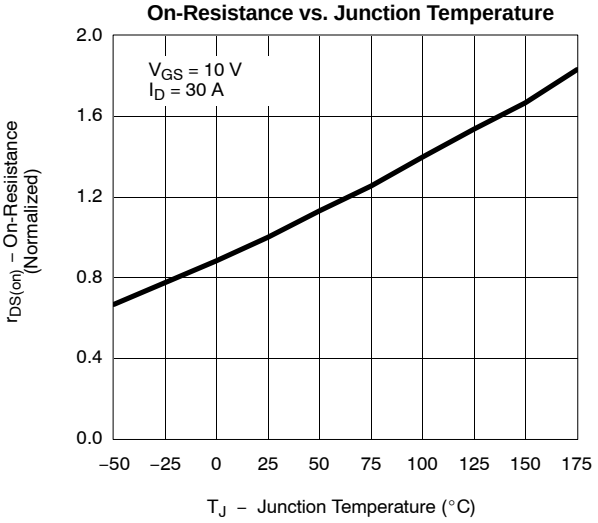


Gate Charge

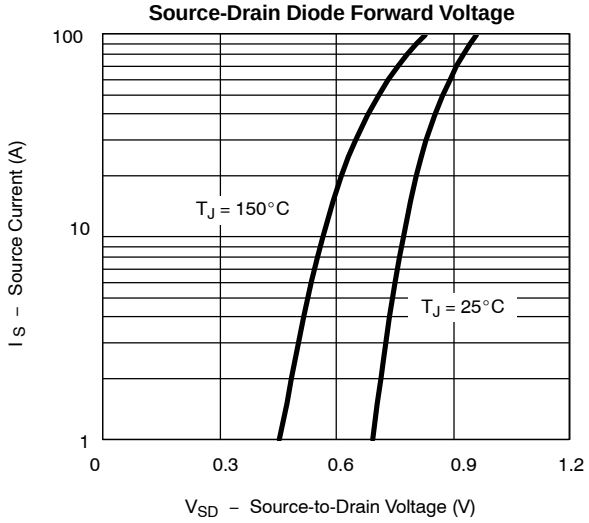


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

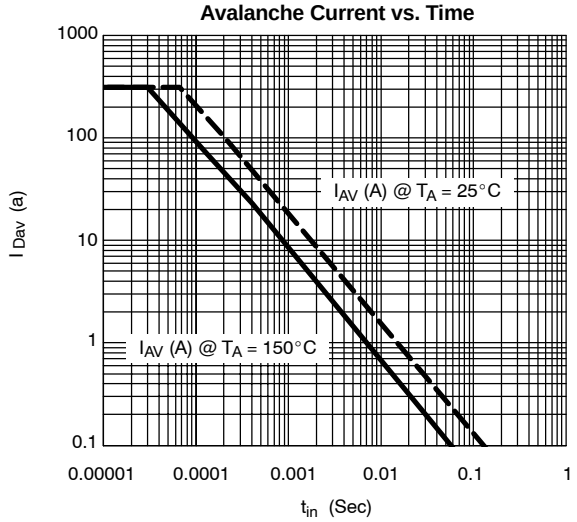
On-Resistance vs. Junction Temperature



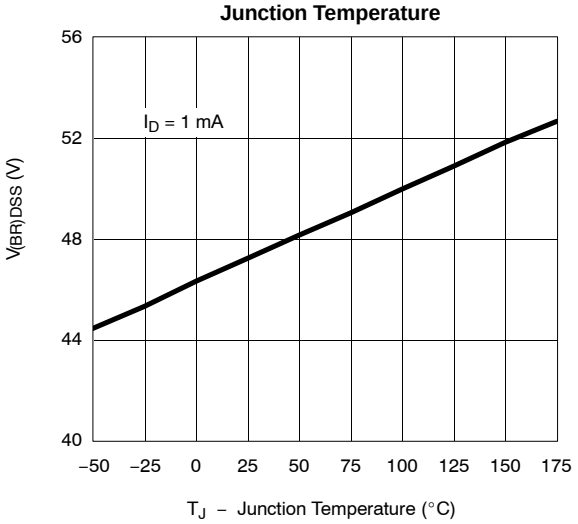
Source-Drain Diode Forward Voltage



Avalanche Current vs. Time

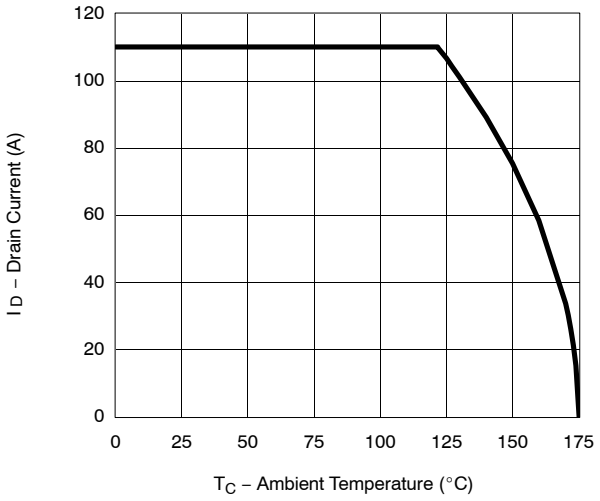


Drain Source Breakdown vs. Junction Temperature

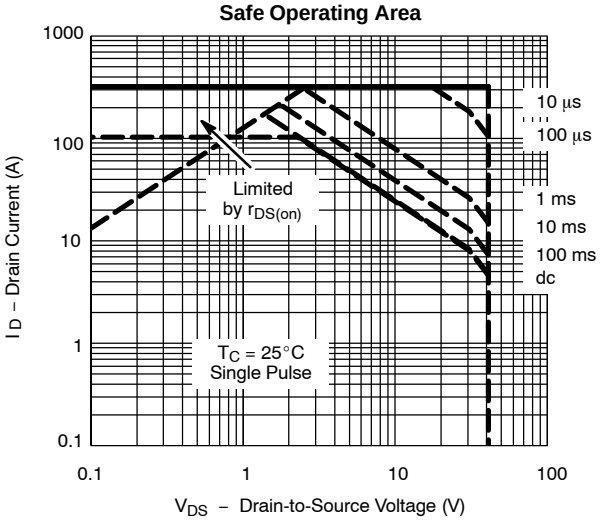


THERMAL RATINGS

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case