N-Channel 40-V (D-S) 200°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.0028 @ V_{GS} = 10 V	110 [a]

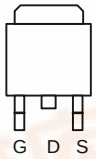
FEATURES

- TrenchFET® Power MOSFET
- 200°C Junction Temperature
- New Package with Low Thermal Resistance

APPLICATIONS

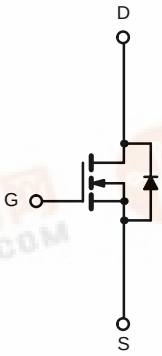
- Automotive
  - ABS
  - 12-V EPS
  - Motor Drives

TO-263



Top View

Ordering Information: SUM110N04-03-



N-Channel MOSFET

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		110[a]	
Pulsed Drain Current		I_{DM}	440	
Avalanche Current		I_{AR}	70	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	211	mJ
Maximum Power Dissipation[b]	T_C = 25°C	P_D	437.5[c]	W
	T_A = 25°C		3.75	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 200	°C

THERMAL RESISTANCE RATINGS				
Parameter		Symbol	Limit	Unit
Junction-to-Ambient	PCB Mount[d]	R_{thJA}	40	°C/W
Junction-to-Case (Drain)		R_{thJC}	0.4	

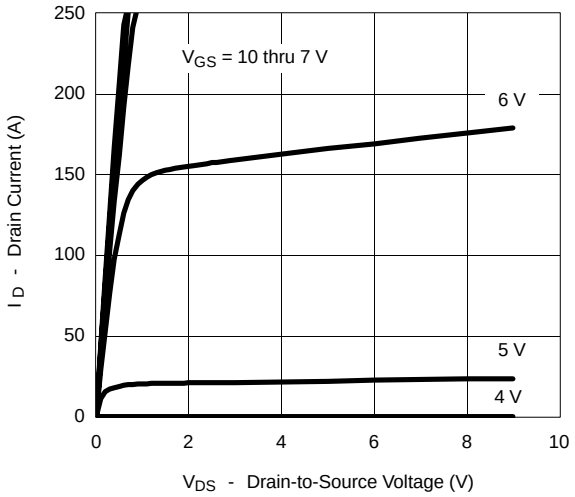
Notes
a. Package limited.
b. Duty cycle ≤ 1%.
c. See SOA curve for voltage derating.
d. When mounted on 1" square PCB (FR-4 material).

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	2.5		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 = 200°C			10	mA
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		0.0023	0.0028	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125°C			0.0045	
		V_{GS} = 10 V, I_D = 30 A, T_J = 200°C			0.0056	
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		8250		pF
Output Capacitance	C_{oss}			1380		
Reverse Transfer Capacitance	C_{rss}			850		
Total Gate Charge[c]	Q_g	V_{DS} = 30 V, V_{GS} = 10 V, I_D = 110 A		165	250	nC
Gate-Source Charge[c]	Q_{gs}			45		
Gate-Drain Charge[c]	Q_{gd}			65		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 30 V, R_L = 0.27 Ω I_D ≅ 110 A, V_{GEN} = 10 V, R_G = 2.5 Ω		25	40	ns
Rise Time[c]	t_r			170	255	
Turn-Off Delay Time[c]	$t_{d(off)}$			55	85	
Fall Time[c]	t_f			110	165	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_S				110	A
Pulsed Current	I_{SM}				240	
Forward Voltage[a]	V_{SD}	I_F = 85 A, V_{GS} = 0 V		1.1	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 85 A, di/dt = 100 A/μs		60	90	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			3.0	5	A
Reverse Recovery Charge	Q_{rr}			0.09	0.22	μC

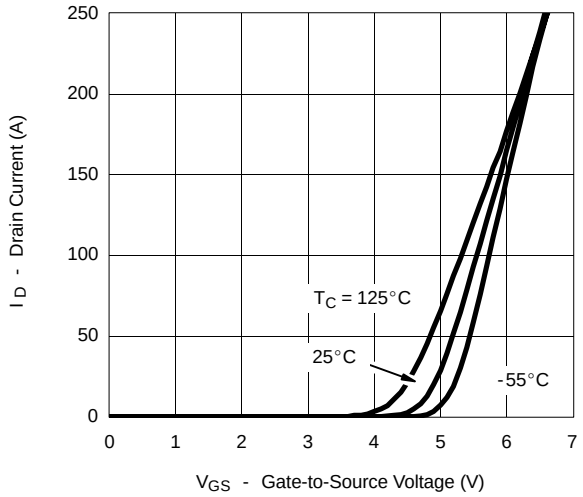
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

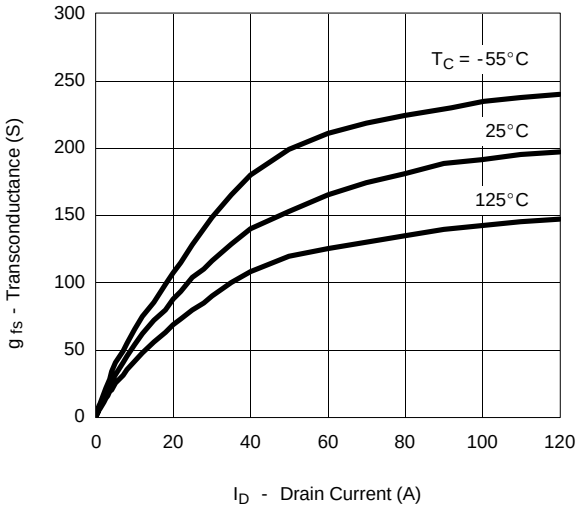
Output Characteristics



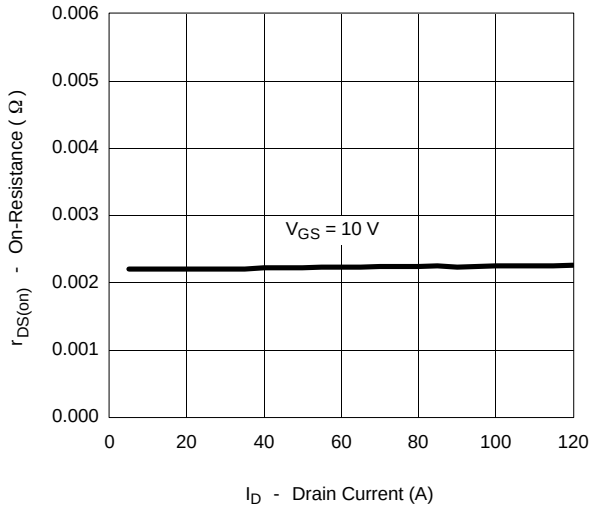
Transfer Characteristics



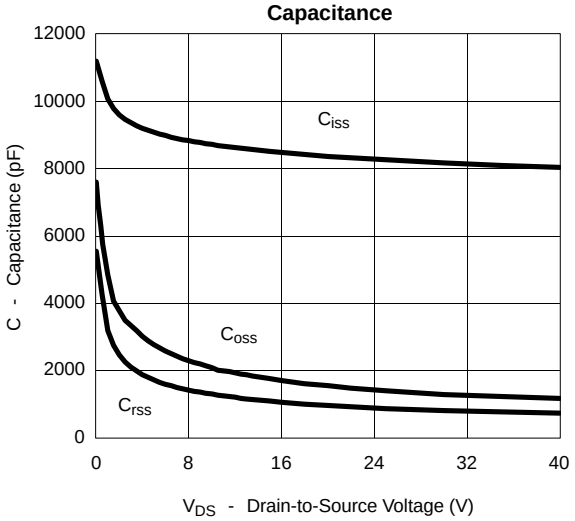
Transconductance



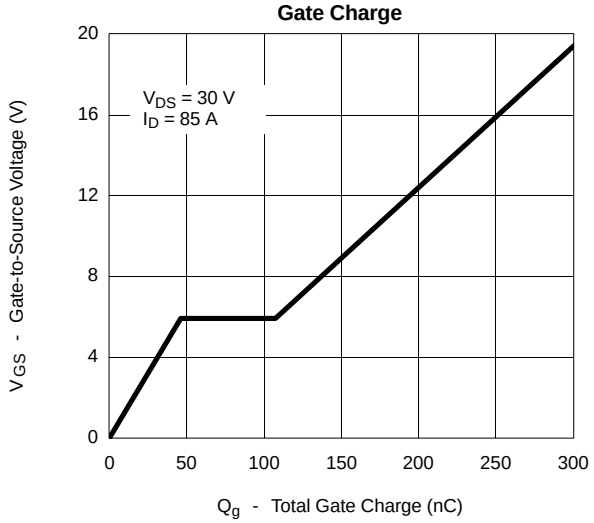
On-Resistance vs. Drain Current



Capacitance



Gate Charge



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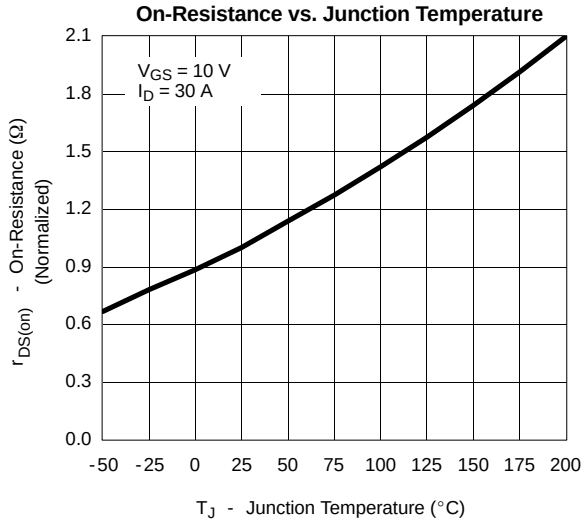
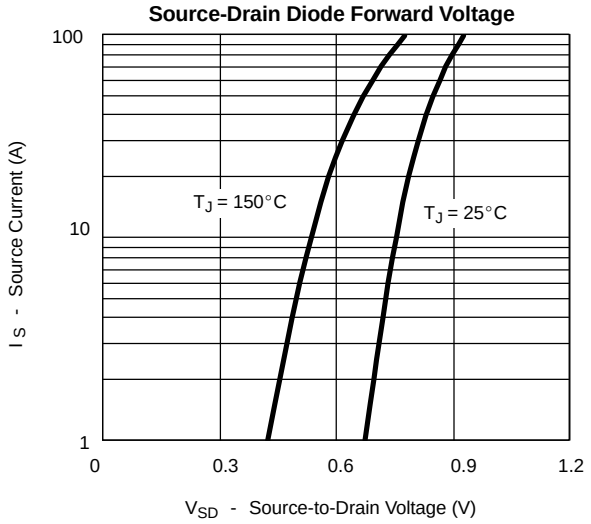
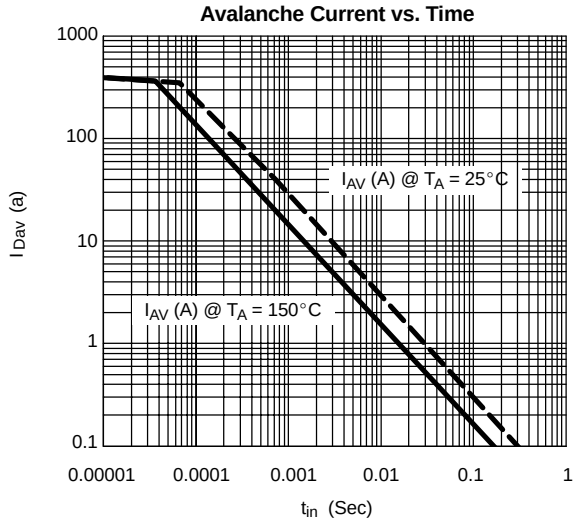
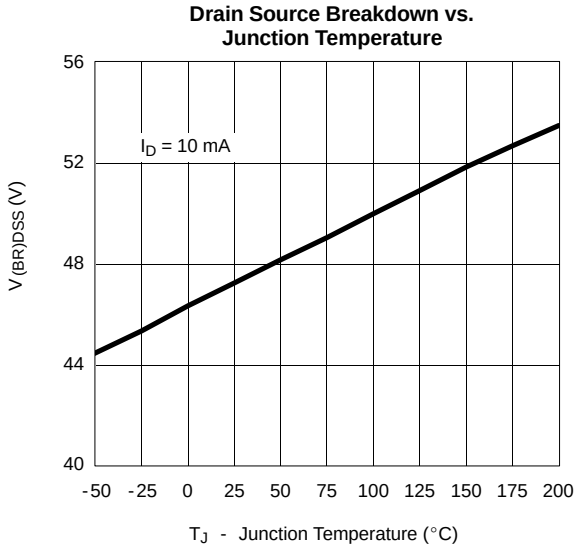


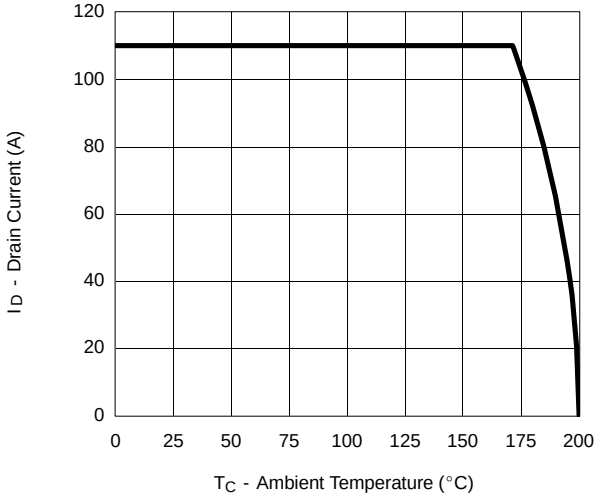




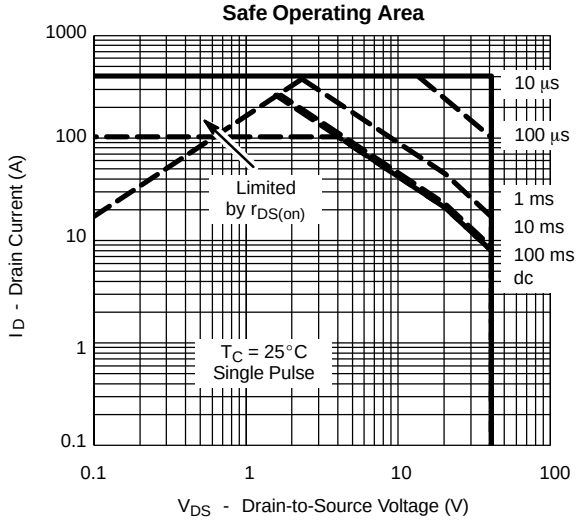


THERMAL RATINGS

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case