

N-Channel 40-V (D-S) 175 °C MOSFET

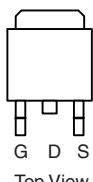
PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.0031 at $V_{GS} = 10$ V	110 ^a

FEATURES

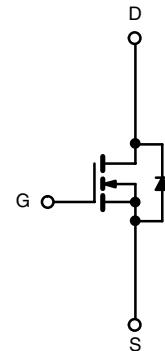
- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- Package with Low Thermal Resistance
- Extremely Low Q_{gd} WFET™ Technology for Low Switching Losses
- 100 % R_g Tested



TO-263



Top View



Ordering Information: SUM110N04-03P-E3 (Lead (Pb)-free)

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)	I_D	110 ^a	A
		110 ^a	
Pulsed Drain Current	I_{DM}	440	
Avalanche Current	I_{AS}	70	
Single Pulse Avalanche Energy ^b	E_{AS}	211	mJ
	P_D	375 ^c	W
Maximum Power Dissipation ^b		3.75	
	- 55 to 175	°C	
Operating Junction and Storage Temperature Range	T_J, T_{stg}		

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient	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).

* Pb containing terminations are not RoHS compliant, exemptions may apply.

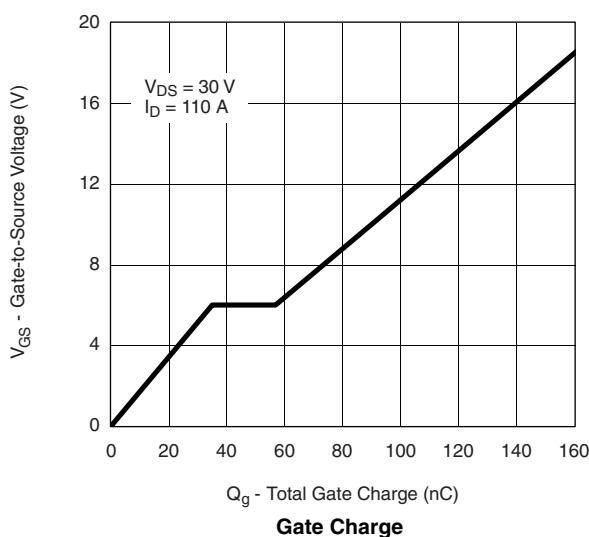
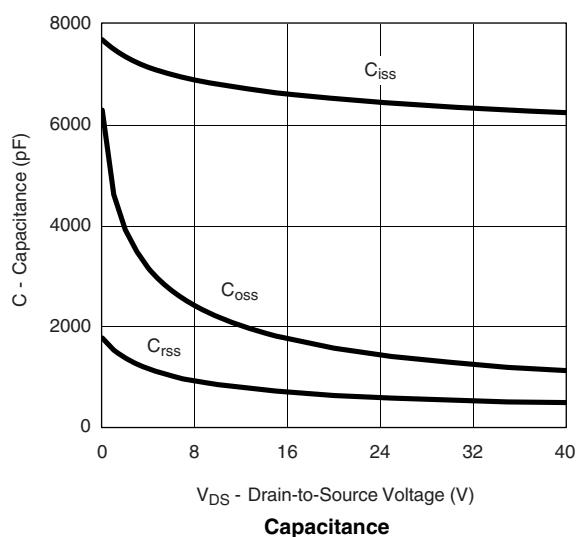
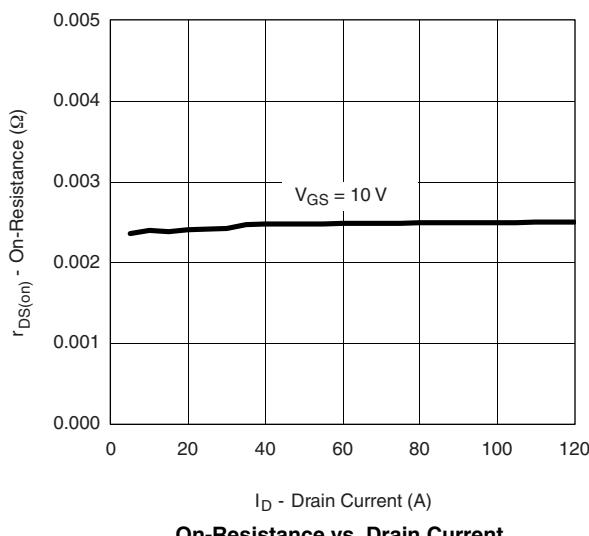
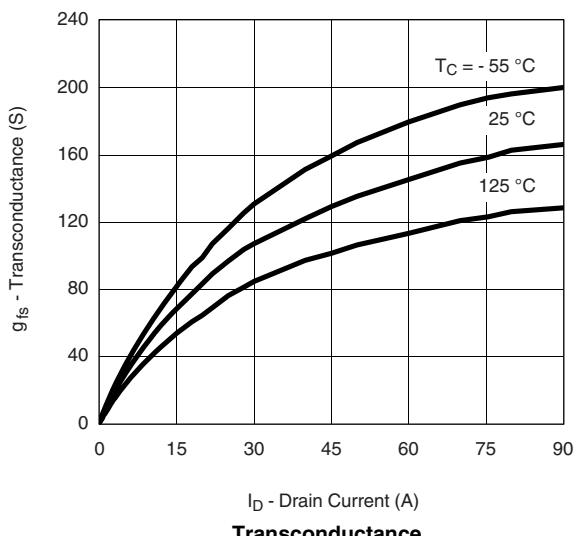
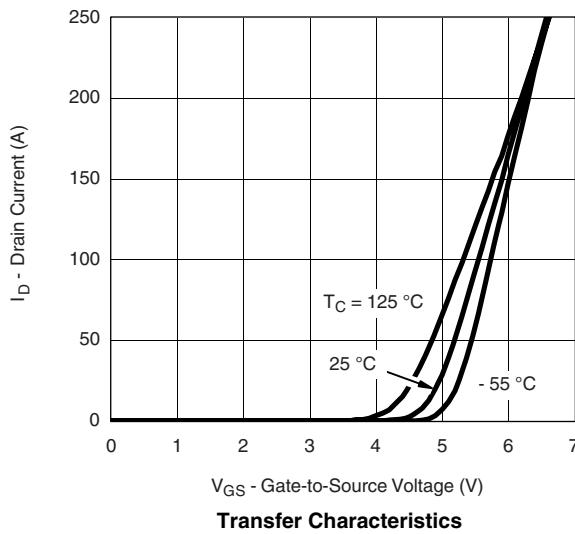
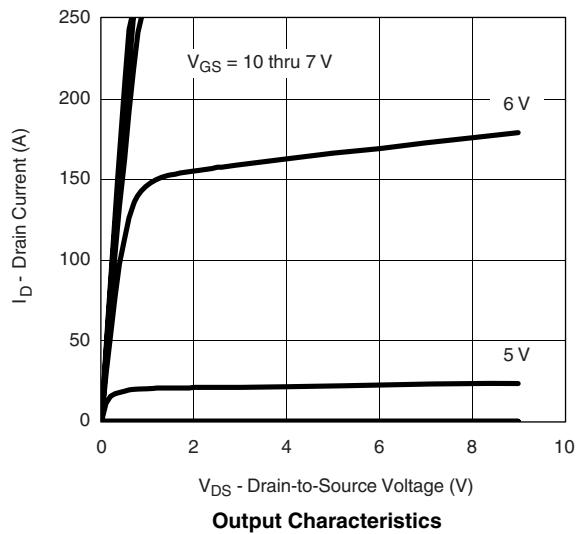
SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted

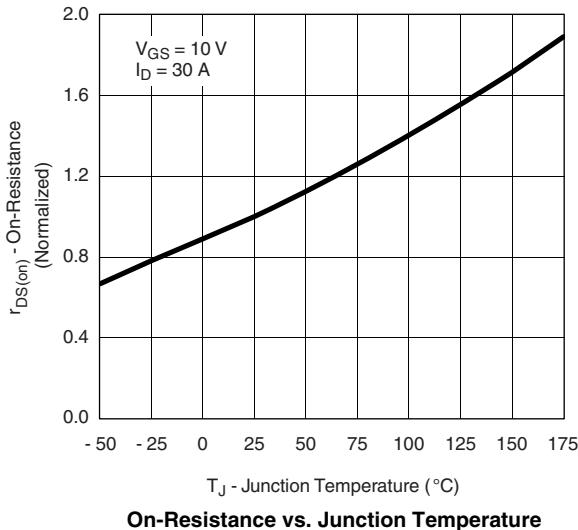
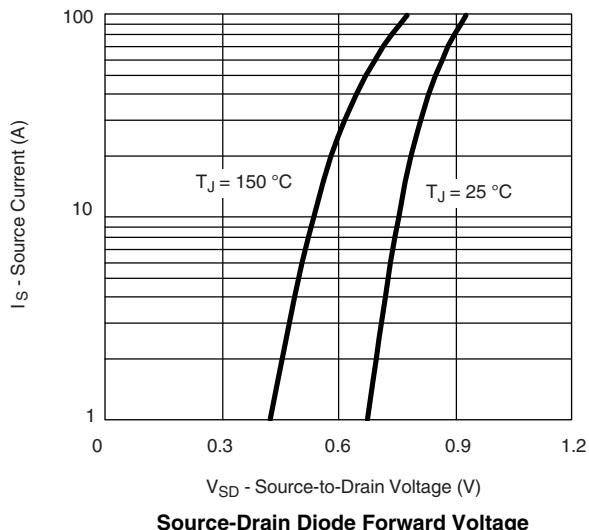
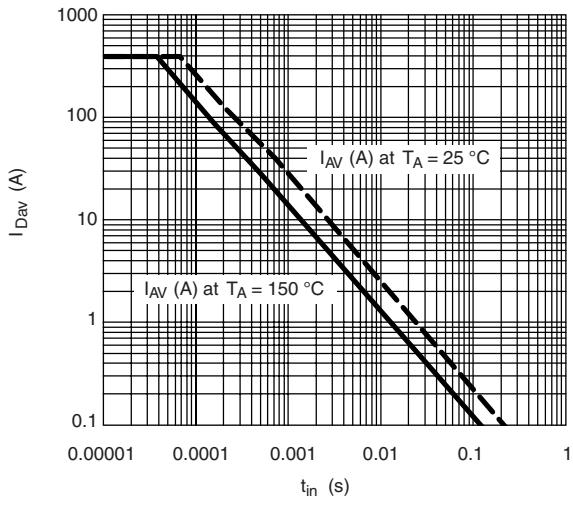
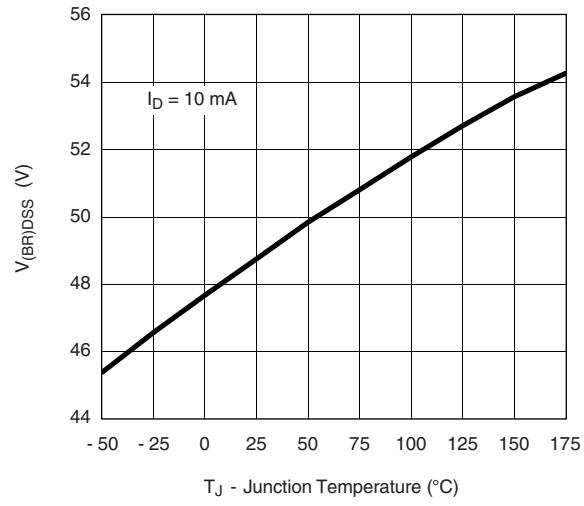
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{DS}} = 0 \text{ V}, I_D = 250 \mu\text{A}$	40			V
Gate-Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = 250 \mu\text{A}$	2.5		4	
Gate-Body Leakage	I_{GSS}	$V_{\text{DS}} = 0 \text{ V}, V_{\text{GS}} = \pm 20 \text{ V}$			100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 40 \text{ V}, V_{\text{GS}} = 0 \text{ V}$			1	μA
		$V_{\text{DS}} = 40 \text{ V}, V_{\text{GS}} = 0 \text{ V}, T_J = 125^\circ\text{C}$			50	
		$V_{\text{DS}} = 40 \text{ V}, V_{\text{GS}} = 0 \text{ V}, T_J = 175^\circ\text{C}$			250	
On-State Drain Current ^a	$I_{\text{D}(\text{on})}$	$V_{\text{DS}} \geq 5 \text{ V}, V_{\text{GS}} = 10 \text{ V}$	120			A
Drain-Source On-State Resistance ^a	$r_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10 \text{ V}, I_D = 30 \text{ A}$		0.0025	0.0031	Ω
		$V_{\text{GS}} = 10 \text{ V}, I_D = 30 \text{ A}, T_J = 125^\circ\text{C}$			0.0049	
		$V_{\text{GS}} = 10 \text{ V}, I_D = 30 \text{ A}, T_J = 175^\circ\text{C}$			0.0059	
Forward Transconductance ^a	g_{fs}	$V_{\text{DS}} = 15 \text{ V}, I_D = 30 \text{ A}$	30			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0 \text{ V}, V_{\text{DS}} = 25 \text{ V}, f = 1 \text{ MHz}$		6500		pF
Output Capacitance	C_{oss}			1400		
Reverse Transfer Capacitance	C_{rss}			570		
Total Gate Charge ^c	Q_g	$V_{\text{DS}} = 30 \text{ V}, V_{\text{GS}} = 10 \text{ V}, I_D = 110 \text{ A}$		90	150	nC
Gate-Source Charge ^c	Q_{gs}			35		
Gate-Drain Charge ^c	Q_{gd}			22		
Gate Resistance	R_g	$f = 1 \text{ MHz}$	0.5	1.1	1.9	Ω
Turn-On Delay Time ^c	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 30 \text{ V}, R_L = 0.27 \Omega$ $I_D \approx 110 \text{ A}, V_{\text{GEN}} = 10 \text{ V}, R_G = 2.5 \Omega$		145	220	ns
Rise Time ^c	t_r			35	55	
Turn-Off Delay Time ^c	$t_{\text{d}(\text{off})}$			20	30	
Fall Time ^c	t_f			55	85	
Source-Drain Diode Ratings and Characteristics $T_C = 25^\circ\text{C}^b$						
Continuous Current	I_S				110	A
Pulsed Current	I_{SM}				240	
Forward Voltage ^a	V_{SD}	$I_F = 85 \text{ A}, V_{\text{GS}} = 0 \text{ V}$		1.1	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 85 \text{ A}, \text{di/dt} = 100 \text{ A}/\mu\text{s}$		60	90	ns
Peak Reverse Recovery Charge	$I_{\text{RM}(\text{REC})}$			2.5	5	A
Reverse Recovery Charge	Q_{rr}			0.075	0.22	μC

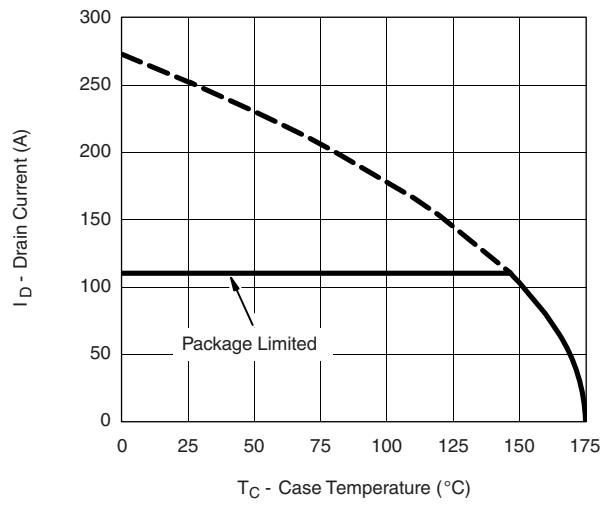
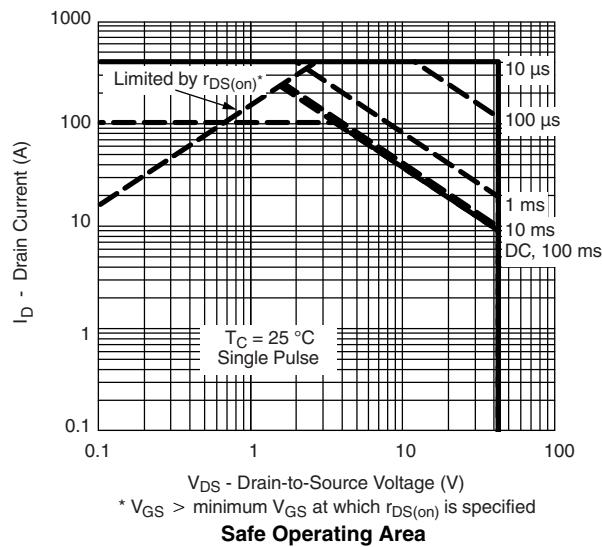
Notes:

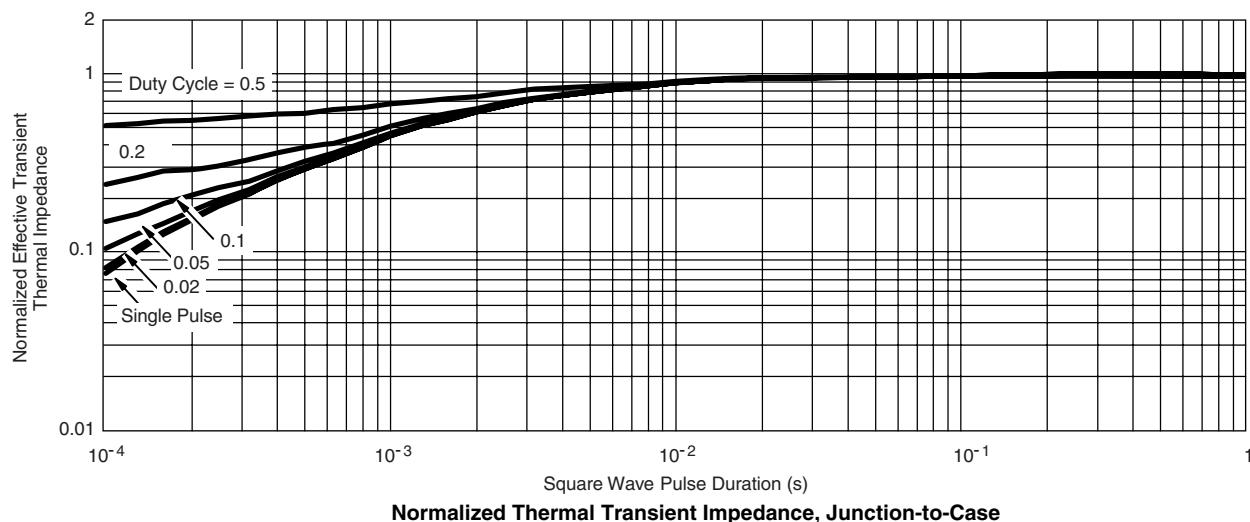
- a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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 otherwise noted


TYPICAL CHARACTERISTICS 25 °C, unless otherwise 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

* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified

Safe Operating Area

Normalized Thermal Transient Impedance, Junction-to-Case

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