N-Channel 150-V (D-S) 175°C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
150	0.019 @ V_{GS} = 10 V	85 [a]
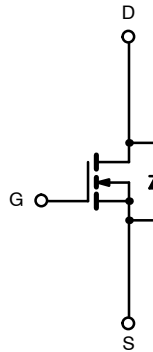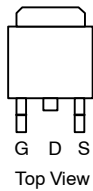
FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- New Low Thermal Resistance Package
- 100% R_g Tested

APPLICATIONS

- Primary Side Switch
- Automotive
  - 42-V EPS and ABS
  - DC/DC Conversion
  - Motor Drives

TO-263

G D S

Top View

Ordering Information: SUM85N15-19
SUM85N15-19-E3 (Lead Free)

N-Channel MOSFET

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	150	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	85[a]	A
	T_C = 125°C		50[a]	
Pulsed Drain Current		I_{DM}	180	
Avalanche Current		I_{AR}	50	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	125	mJ
Maximum Power Dissipation[b]	T_C = 25°C	P_D	375[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 (TO-263)[d]	R_{thJA}	40	°C/W
Junction-to-Case (Drain)		R_{thJC}	0.4	

Notes
a. Package limited.
b. Duty cycle $\leq$ 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	150			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$_{DS}$ = 150 V, V$_{GS}$ = 0 V			1	μA
		V$_{DS}$ = 150 V, V$_{GS}$ = 0 V, T$_J$ = 125°C			50	
		V$_{DS}$ = 150 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		0.015	0.019	Ω
		V$_{GS}$ = 10 V, I$_D$ = 30 A, T$_J$ = 125°C			0.038	
		V$_{GS}$ = 10 V, I$_D$ = 30 A, T$_J$ = 175°C			0.050	
Forward Transconductance[a]	g$_{fs}$	V$_{DS}$ = 15 V, I$_D$ = 30 A	25			S
Dynamic[b]						
Input Capacitance	C$_{iss}$	V$_{GS}$ = 0 V, V$_{DS}$ = 25 V, f = 1 MHz		4750		pF
Output Capacitance	C$_{oss}$			530		
Reverse Transfer Capacitance	C$_{rss}$			220		
Total Gate Charge[c]	Q$_g$	V$_{DS}$ = 75 V, V$_{GS}$ = 10 V, I$_D$ = 85 A		76	110	nC
Gate-Source Charge[c]	Q$_{gs}$			21		
Gate-Drain Charge[c]	Q$_{gd}$			26		
Gate Resistance	R$_g$		0.5	1.8	3.0	Ω
Turn-On Delay Time[c]	t$_{d(on)}$	V$_{DD}$ = 75 V, R$_L$ = 0.9 Ω		22	35	ns
Rise Time[c]	t$_r$	I$_D$ ≅ 85 A, V$_{GEN}$ = 10 V, R$_g$ = 2.5 Ω		170	250	
Turn-Off Delay Time[c]	t$_{d(off)}$			40	60	
Fall Time[c]	t$_f$			170	250	
Source-Drain Diode Ratings and Characteristics (T$_C$ = 25°C)[b]						
Continuous Current	I$_S$				85	A
Pulsed Current	I$_{SM}$				180	
Forward Voltage[a]	V$_{SD}$	I$_F$ = 85 A, V$_{GS}$ = 0 V		1.0	1.5	V
Reverse Recovery Time	t$_{rr}$	I$_F$ = 50 A, di/dt = 100 A/μs		130	200	ns
Peak Reverse Recovery Current	I$_{RM(REC)}$			8	12	A
Reverse Recovery Charge	Q$_{rr}$			0.52	1.2	μC

Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
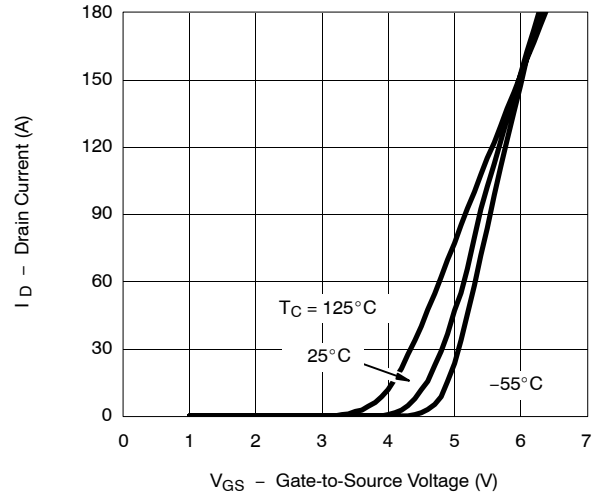c. Independent of operating temperature.
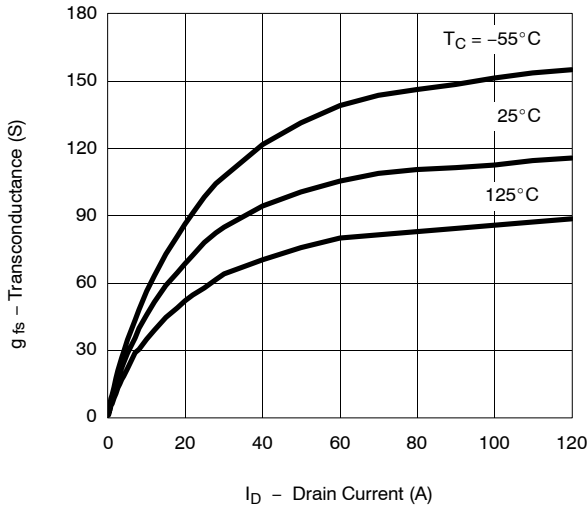
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)
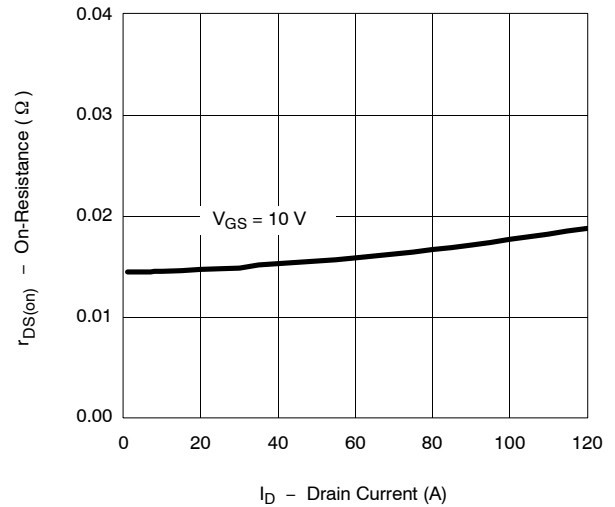
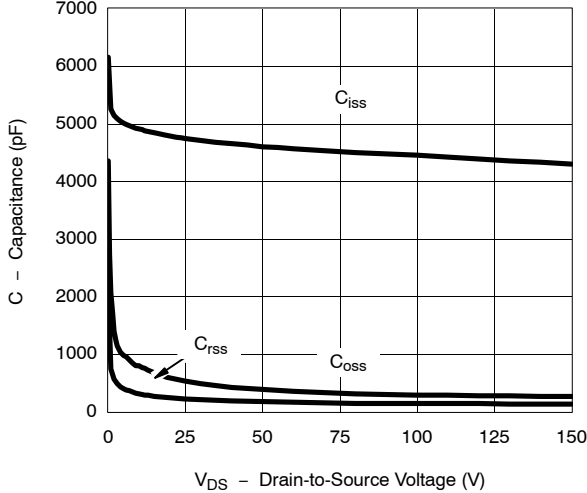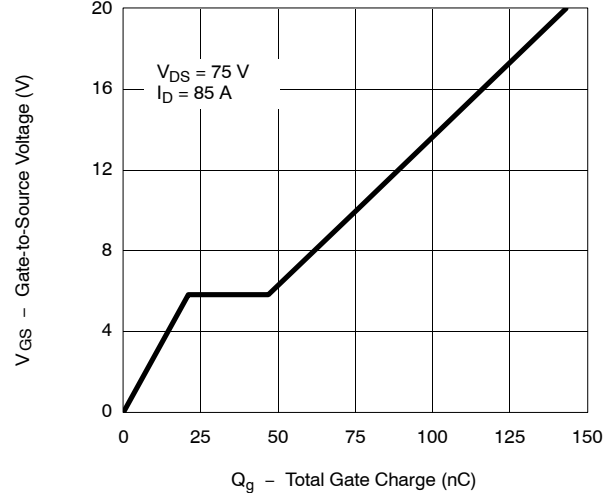**Output Characteristics**
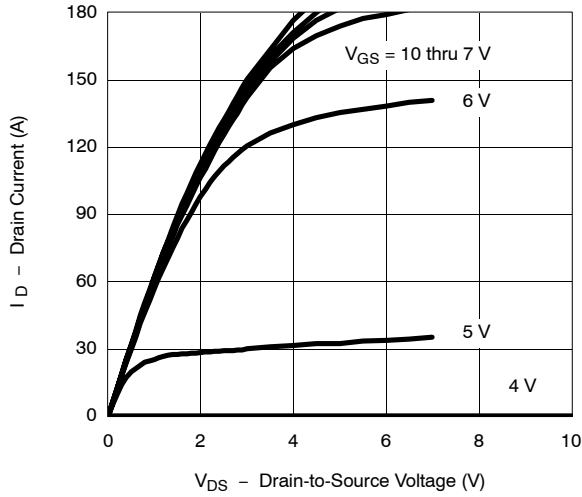
Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge
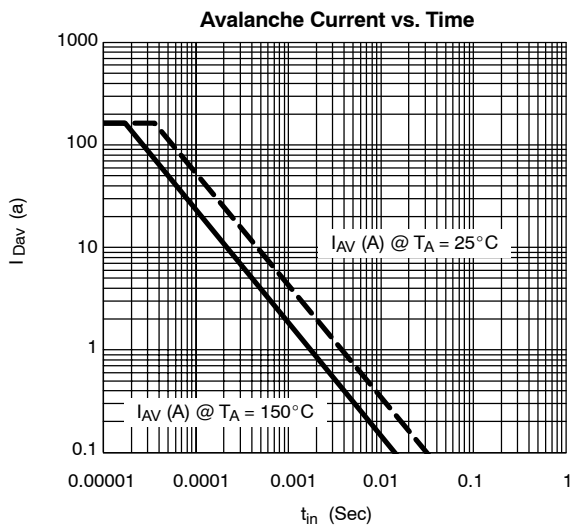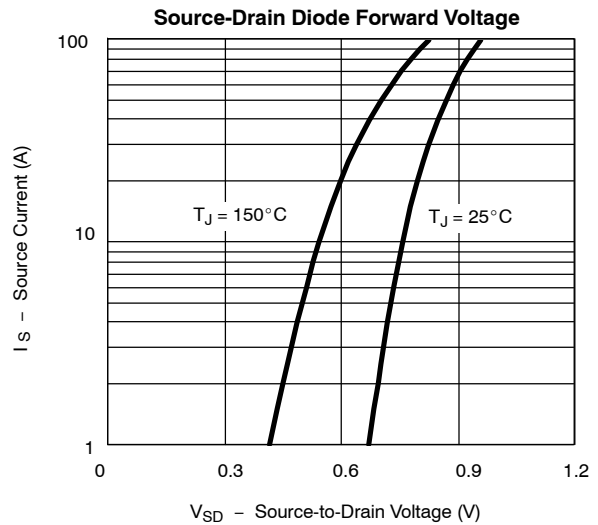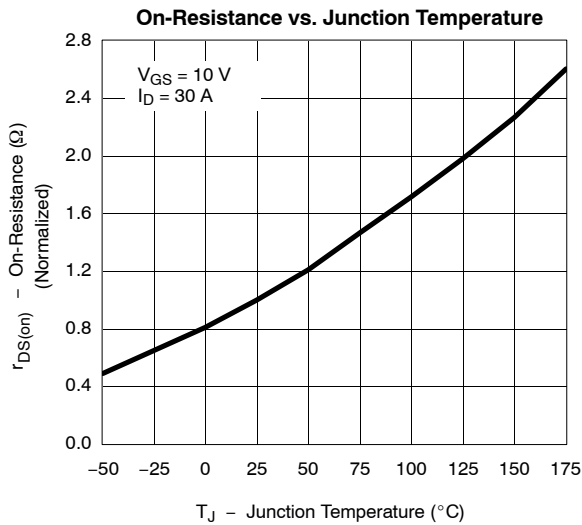
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

$V_{GS} = 10$ V
$I_D = 30$ A

$r_{DS(on)}$ – On-Resistance (Ω) (Normalized)

T_J – Junction Temperature (°C)

Source-Drain Diode Forward Voltage

I_S – Source Current (A)

$T_J = 150°C$

$T_J = 25°C$

V_{SD} – Source-to-Drain Voltage (V)

Avalanche Current vs. Time

I_{Dav} (a)

I_{AV} (A) @ $T_A = 25°C$

I_{AV} (A) @ $T_A = 150°C$

t_{in} (Sec)

Drain Source Breakdown vs. Junction Temperature

$V_{(BR)DSS}$ (V)

$I_D = 1.0$ mA

T_J – Junction Temperature (°C)
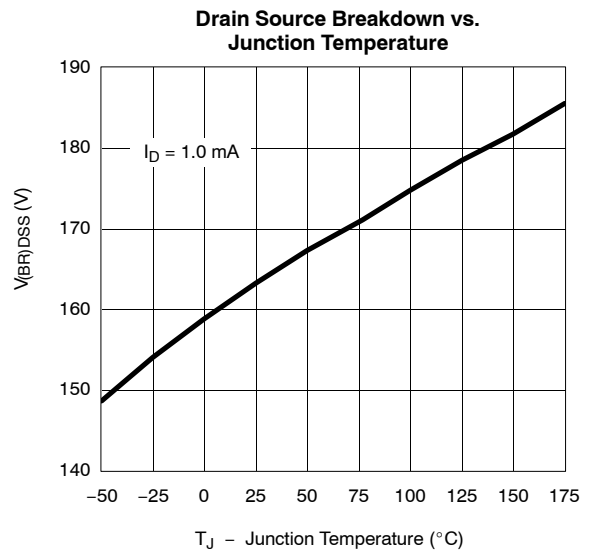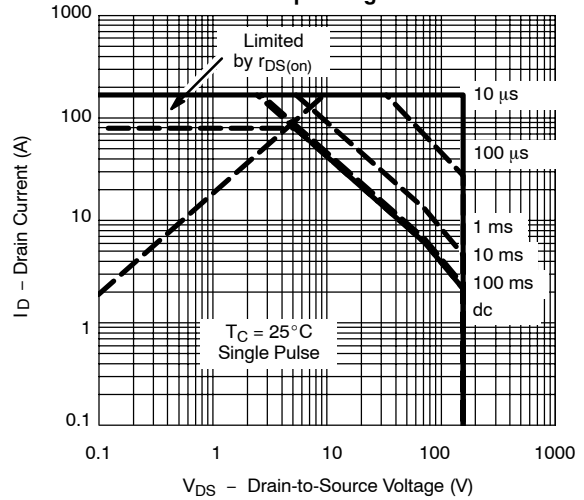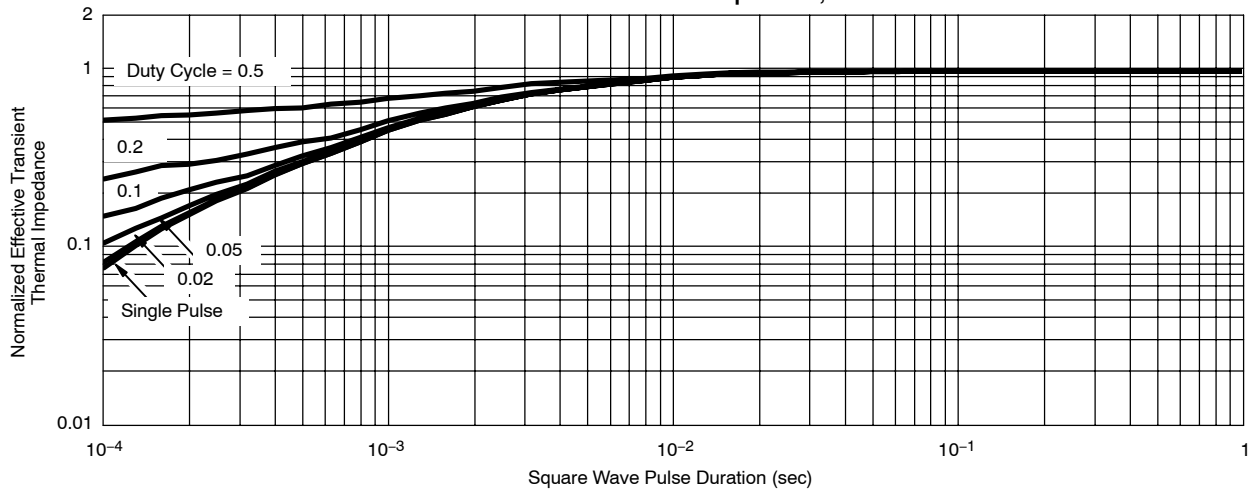
THERMAL RATINGS

Maximum Avalanche and Drain Current vs. Case Temperature
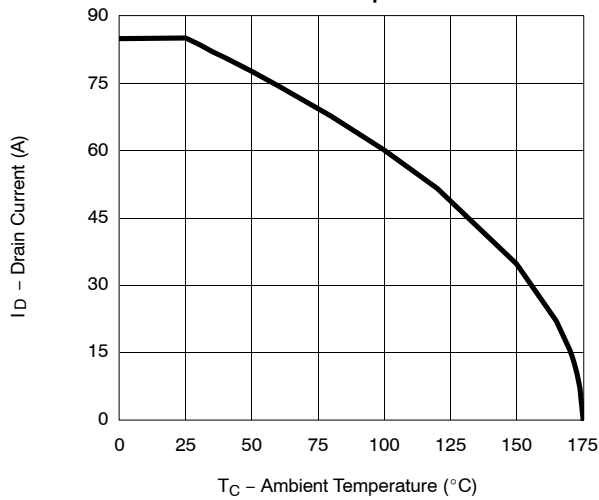
Safe Operating Area

Normalized Thermal Transient Impedance, Junction-to-Case

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