

N-Channel 55-V (D-S), 175 °C MOSFET, Logic Level

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
55	0.019 at $V_{GS} = 10$ V	40
	0.025 at $V_{GS} = 4.5$ V	35

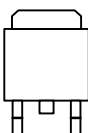
FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature



Available
RoHS*
COMPLIANT

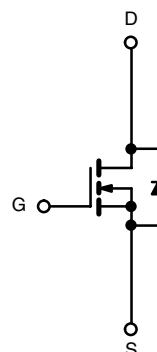
TO-263



Top View

DRAIN connected to TAB

Ordering Information: SUM40N05-19L-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}	55	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	I_D	40	A
		28	
Pulsed Drain Current	I_{DM}	80	
Avalanche Current, Single Pulse	I_{AS}	30	mJ
Avalanche Energy, Single Pulse	E_{AS}	45	
Power Dissipation	P_D	65 ^a	W
		3.1 ^b	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient	R_{thJA}	40	°C/W
Junction-to-Case	R_{thJC}	2.3	

Notes:

a. See SOA curve for voltage derating.

b. Surface Mounted on FR4 board, $t \leq 10$ s.

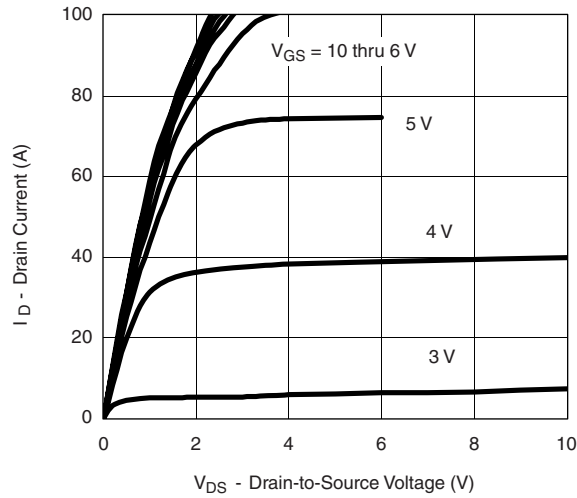
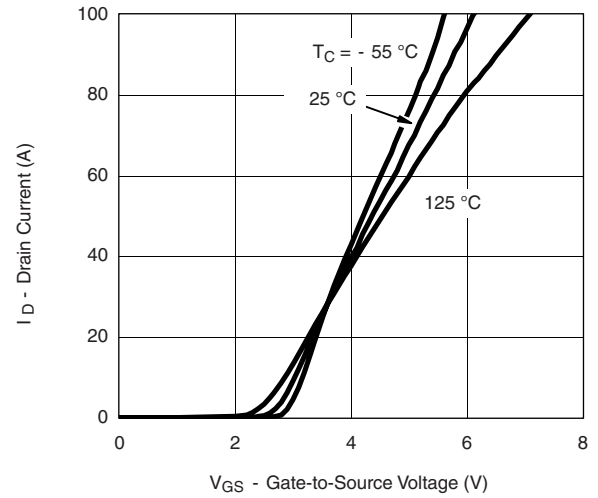
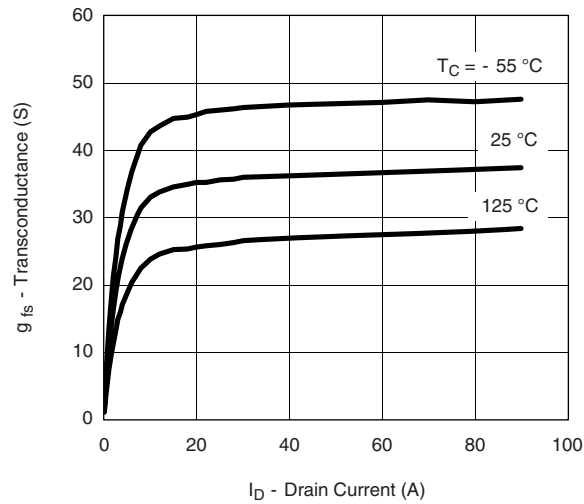
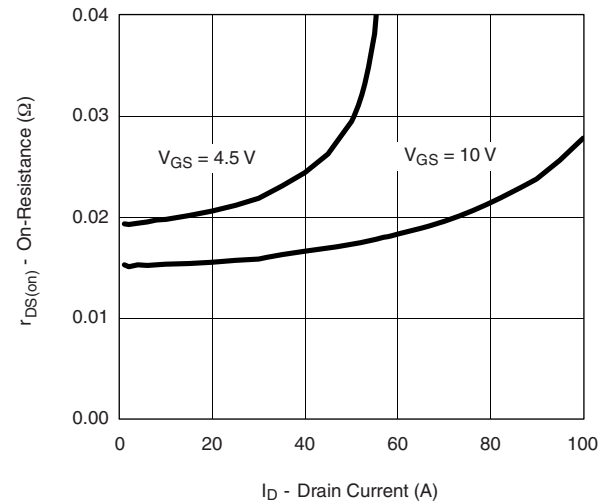
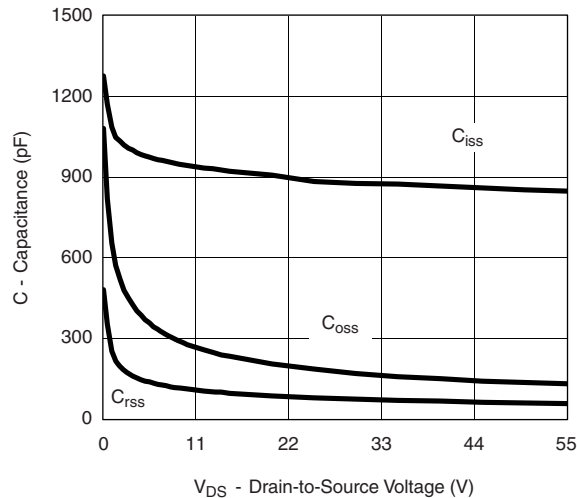
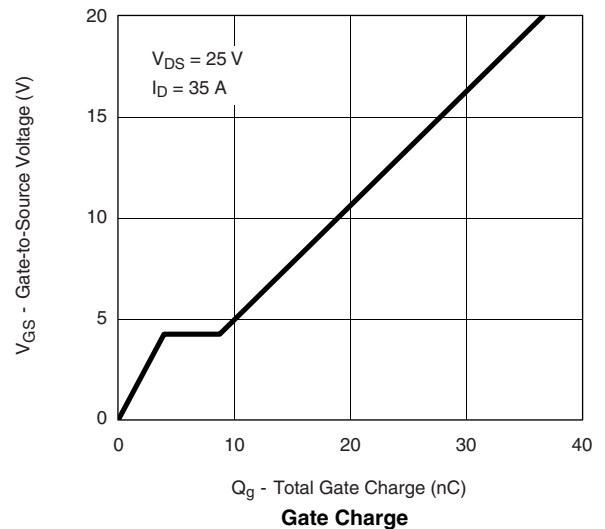
* Pb containing terminations are not RoHS compliant, exemptions may apply.

SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	55			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _{DS} = 250 μA	1.0	2.0	3.0	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 55 V, V _{GS} = 0 V			1	μA
		V _{DS} = 55 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 55 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	40			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0155	0.019	Ω
		V _{GS} = 10 V, I _D = 20 A, T _J = 125 °C			0.033	
		V _{GS} = 10 V, I _D = 20 A, T _J = 175 °C			0.040	
		V _{GS} = 4.5 V, I _D = 15 A		0.020	0.025	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A		50		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		885		pF
Output Capacitance	C _{oss}			185		
Reverse Transfer Capacitance	C _{rss}			80		
Total Gate Charge ^c	Q _g	V _{DS} = 25 V, V _{GS} = 10 V, I _D = 35 A		10.5	13	nC
Gate-Source Charge ^c	Q _{gs}			4		
Gate-Drain Charge ^c	Q _{gd}			4.8		
Gate Resistance	R _g	f = 1.0 MHz		5.0		Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 25 V, R _L = 0.3 Ω I _D ≅ 35 A, V _{GEN} = 10 V, R _G = 2.5 Ω		5	8	ns
Rise Time ^c	t _r			18	30	
Turn-Off Delay Time ^c	t _{d(off)}			20	30	
Fall Time ^c	t _f			100	150	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				35	A
Pulsed Current	I _{SM}				80	
Forward Voltage ^a	V _{SD}	I _F = 35 A, V _{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 35 A, di/dt = 100 A/μs		25	40	ns
Peak Reverse Recovery Current	I _{RM(REC)}			1.5	2.5	A
Reverse Recovery Charge	Q _{rr}				0.019	0.05

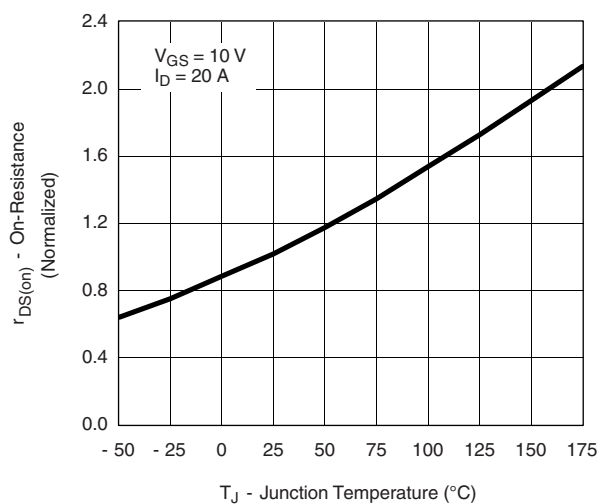
Notes:

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

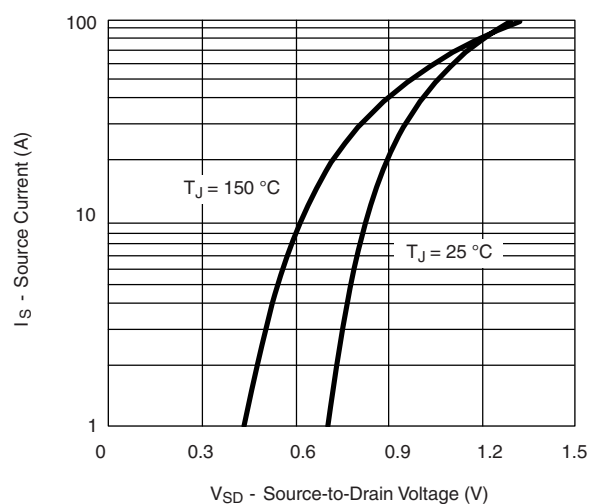
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

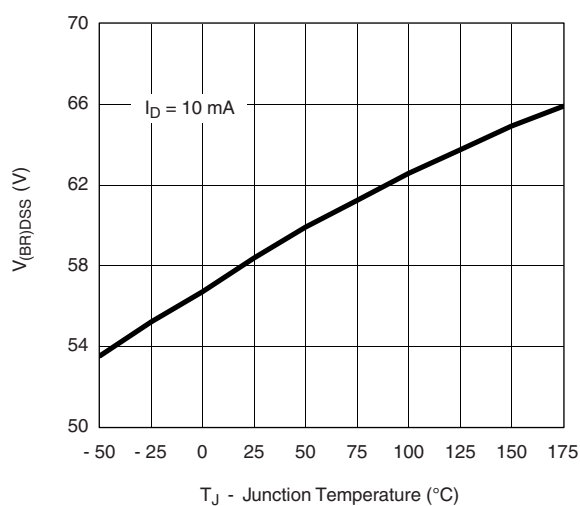
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



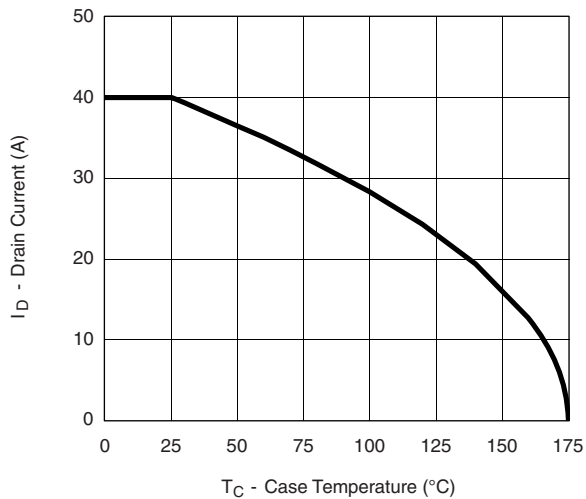
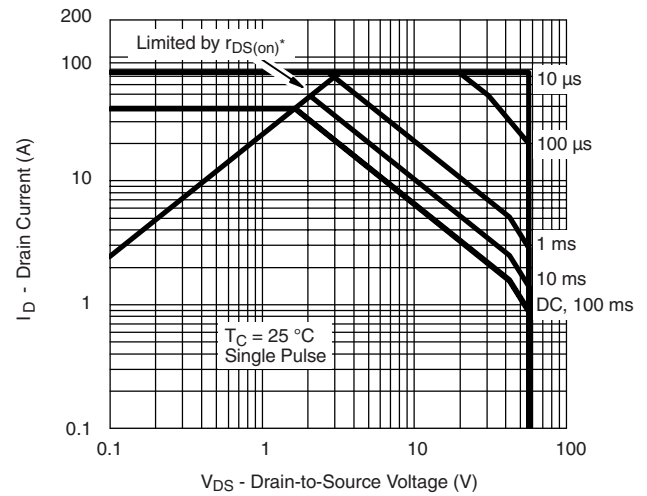
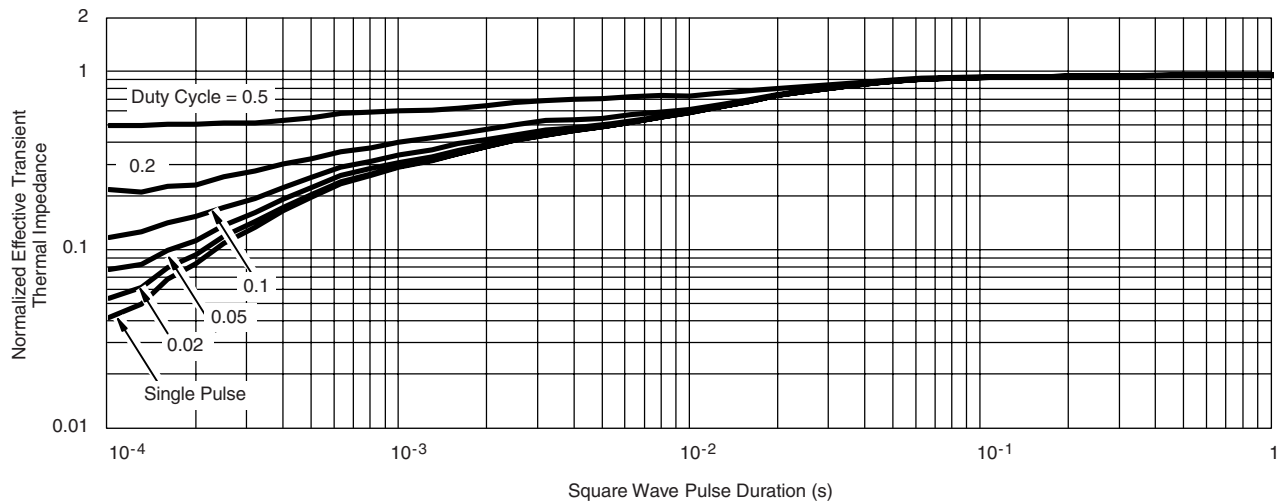
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



Drain Source Breakdown vs. Junction Temperature

**THERMAL RATINGS****Drain Current vs. Case Temperature****Safe Operating Area****Normalized Thermal Transient Impedance, Junction-to-Case**

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