



## P-Channel 60-V (D-S) 175°C MOSFET

## PRODUCT SUMMARY

$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>d</sup>	$Q_g$ (Typ)
-60	0.019 @ $V_{GS} = -10$ V	-55	76
	0.025 @ $V_{GS} = -4.5$ V	-48	

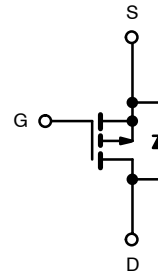
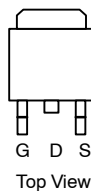
## FEATURES

- TrenchFET® Power MOSFET

## APPLICATIONS

- Automotive Such As
  - High-Side Switch
  - Motor Drives
  - 12-V Boardnet

TO-263



Ordering Information: SUM55P06-19L  
SUM55P06-19L—E3 (Lead (Pb)-Free)

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V <sub>DS</sub>	−60	V
Gate-Source Voltage		V <sub>GS</sub>	± 20	
Continuous Drain Current <sup>d</sup> (T <sub>J</sub> = 175°C)	T <sub>C</sub> = 25°C	I <sub>D</sub>	−55	A
	T <sub>C</sub> = 125°C		−31	
Pulsed Drain Current		I <sub>DM</sub>	−150	
Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	−45	
Single Pulse Avalanche Energy <sup>a</sup>		E <sub>AS</sub>	101	mJ
Power Dissipation	T <sub>C</sub> = 25°C	P <sub>D</sub>	125 <sup>c</sup>	W
	T <sub>A</sub> = 25°C <sup>b</sup>		3.75	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	−55 to 175	°C

## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient PCB Mount <sup>b</sup>	$R_{thJA}$	40	$^\circ\text{C/W}$
Junction-to-Case	$R_{thJC}$	1.2	

## Notes:

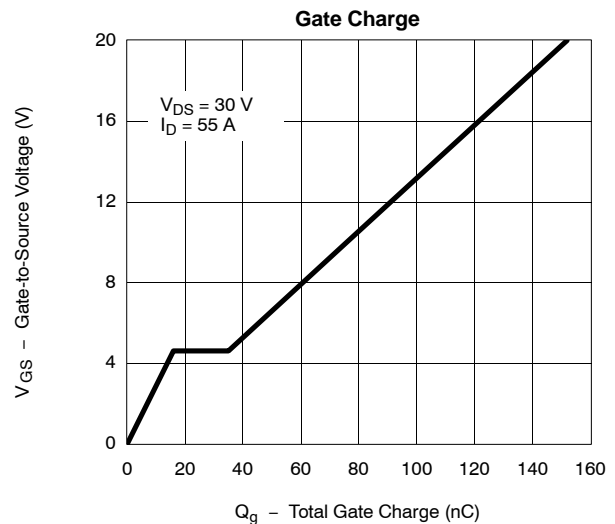
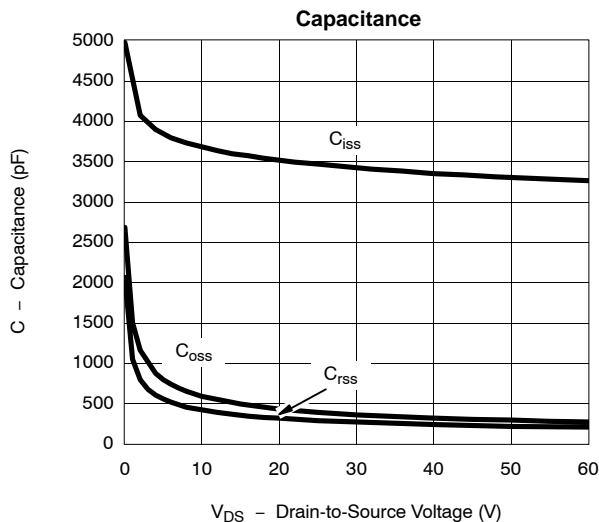
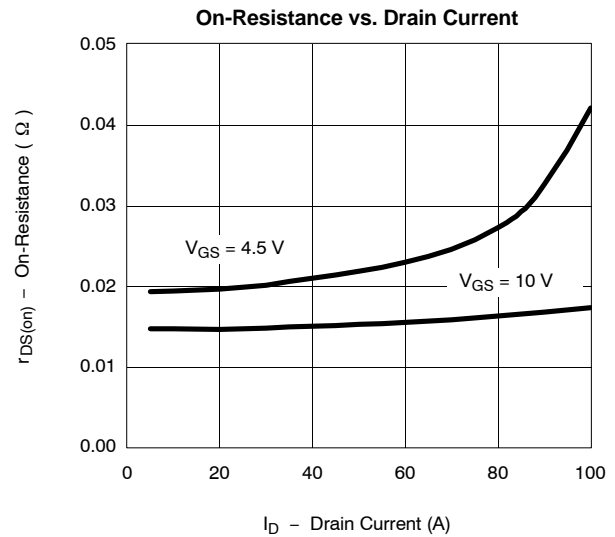
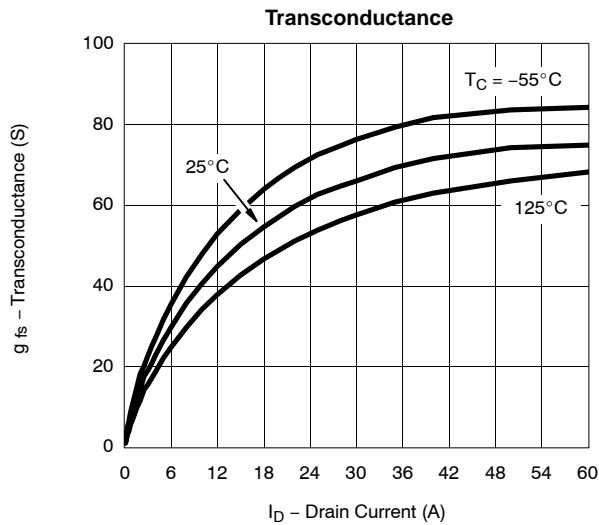
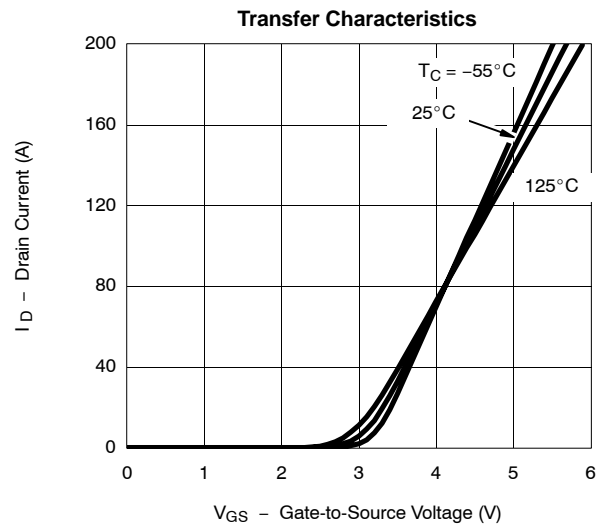
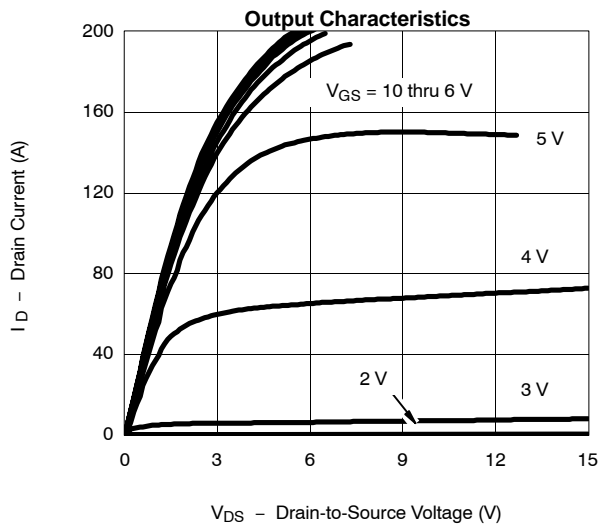
- Duty cycle  $\leq 1\%$ .
- When mounted on 1" square PCB (FR-4 material).
- See SOA curve for voltage derating.
- Limited by package.

SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-60			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-1		-3	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0 V			-1	μA
		V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			-50	
		V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			-250	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -10 V	-120			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A		0.015	0.019	Ω
		V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A, T <sub>J</sub> = 125 °C			0.033	
		V <sub>GS</sub> = -10 V, I <sub>D</sub> = -30 A, T <sub>J</sub> = 175 °C			0.041	
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -20 A		0.020	0.025	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -50 A	20			S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -25 V, f = 1 MHz		3500		pF
Output Capacitance	C <sub>oss</sub>			390		
Reversen Transfer Capacitance	C <sub>rss</sub>			290		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -55 A		76	115	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			16		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			19		
Gate Resistance	R <sub>g</sub>	f = 1.0 MHz		5.2		Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = -30 V, R <sub>L</sub> = 0.54 Ω I <sub>D</sub> ≈ -55 A, V <sub>GEN</sub> = -10 V, R <sub>g</sub> = 2.5 Ω		12	20	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			15	25	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			80	120	
Fall Time <sup>c</sup>	t <sub>f</sub>			230	350	
Source-Drain Diode Ratings and Characteristics (T <sub>C</sub> = 25 °C) <sup>b</sup>						
Continuous Current	I <sub>s</sub>				-110	A
Pulsed Current	I <sub>SM</sub>				-240	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = -50 A, V <sub>GS</sub> = 0 V		-1.0	-1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = -50 A, di/dt = 100 A/μs		45	68	ns
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>			-2.6	4.0	A
Reverse Recovery Charge	Q <sub>rr</sub>				0.059	0.136

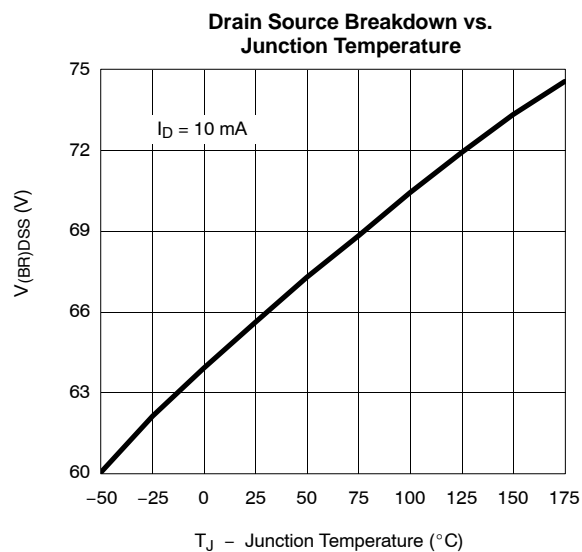
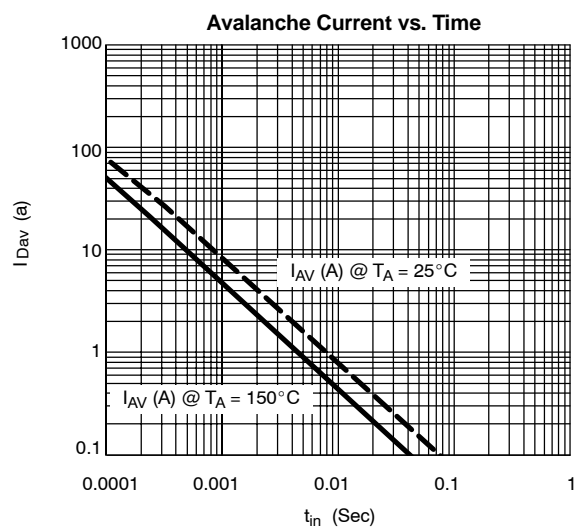
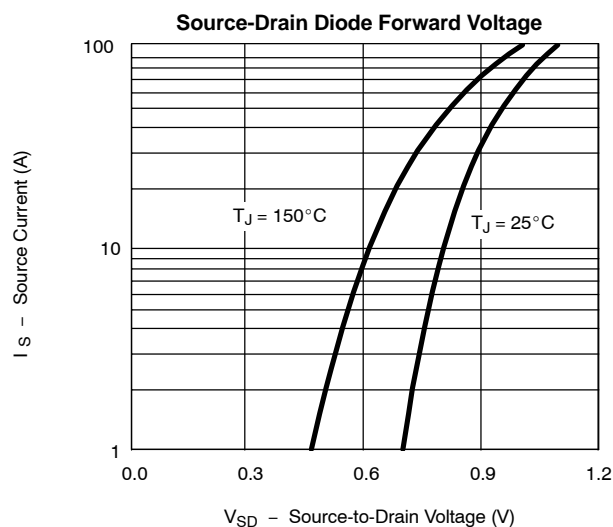
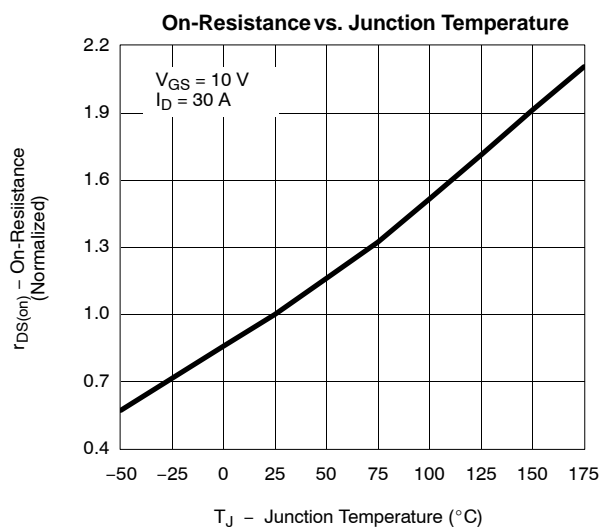
## Notes:

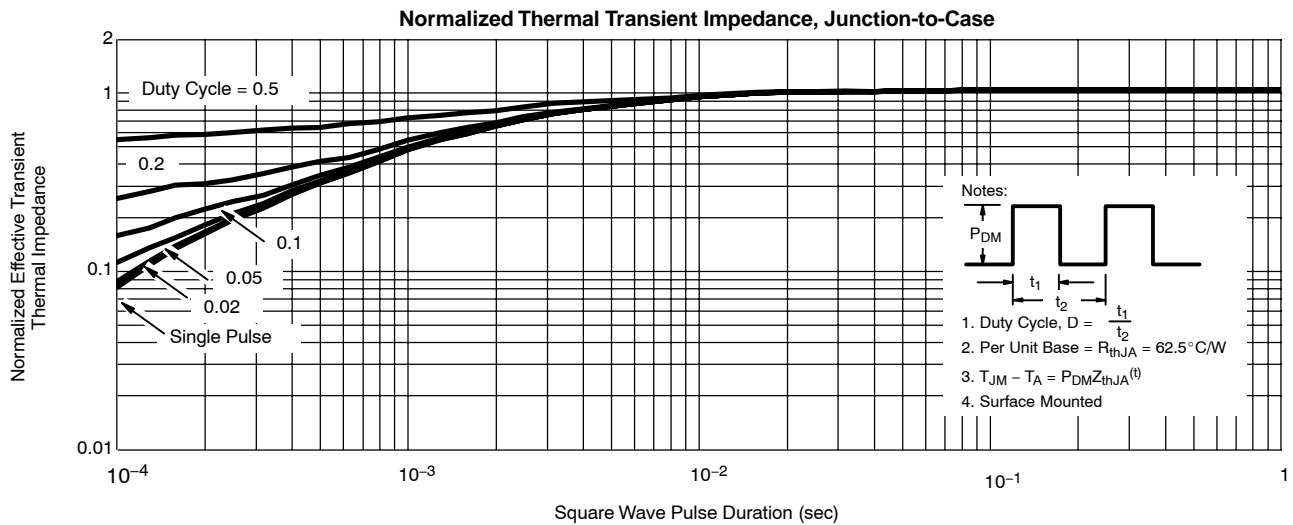
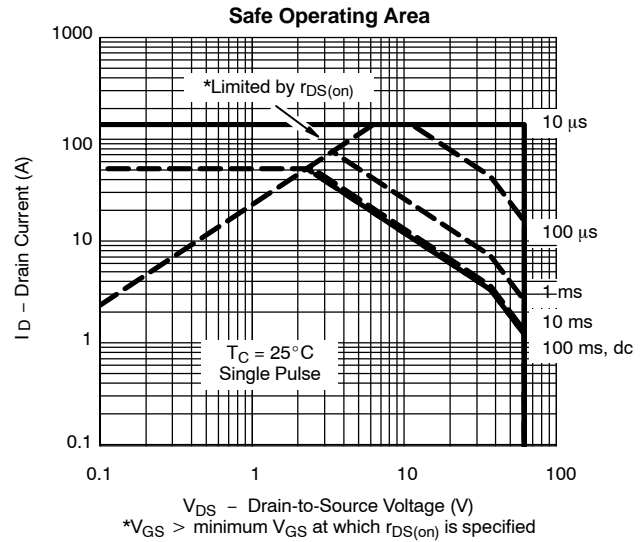
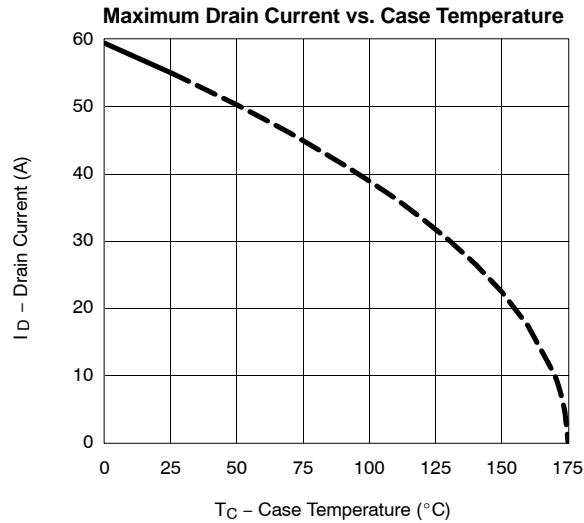
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.  
c. Independent of operating temperature.

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 NOTED)**

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**THERMAL RATINGS**

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?73059>.