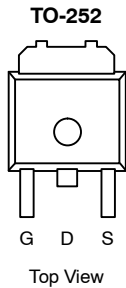




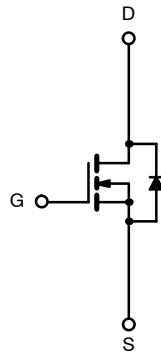
## N-Channel 60-V (D-S) 175°C MOSFET

## PRODUCT SUMMARY

$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>c</sup>
60	0.016 @ $V_{GS} = 10$ V	50



Ordering Information: SUD50N06-16



N-Channel MOSFET

## FEATURES

- TrenchFET® Power MOSFET

## APPLICATIONS

- Automotive
  - ABS
  - EPS
  - Motor Drives
- Industrial

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		$V_{DS}$	60	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ ) <sup>b</sup>	$T_C = 25^\circ\text{C}$	$I_D$	50 <sup>c</sup>	A
	$T_C = 125^\circ\text{C}$		28	
Pulsed Drain Current		$I_{DM}$	100	
Continuous Source Current (Diode Conduction)		$I_S$	50 <sup>c</sup>	
Avalanche Current, Single Pulse		$I_{AS}$	35	
Avalanche Energy	$L = 0.1$ mH	$E_{AS}$	61	mJ
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	$P_D$	88 <sup>b</sup>	W
	$T_A = 25^\circ\text{C}$		3 <sup>a</sup>	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

## THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient <sup>a</sup>	$t \leq 10$ sec	$R_{thJA}$	20	25	$^\circ\text{C/W}$
	Steady State		40	50	
Junction-to-Case		$R_{thJC}$	1.4	1.7	

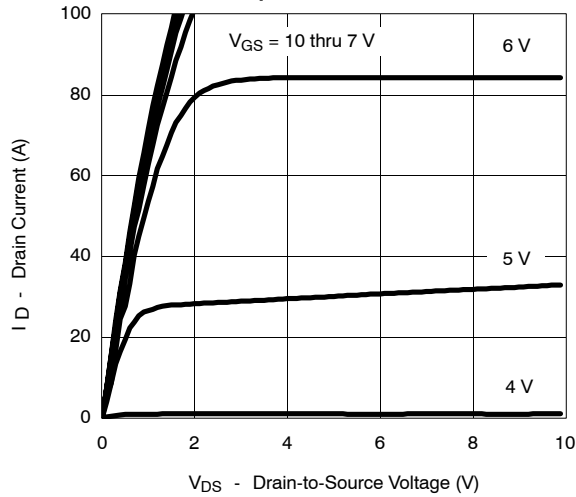
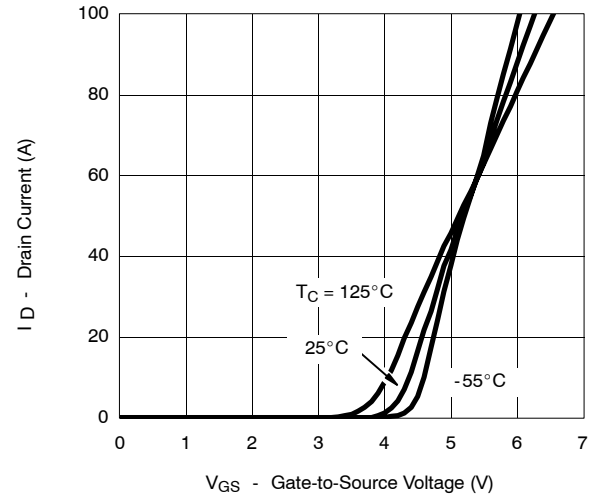
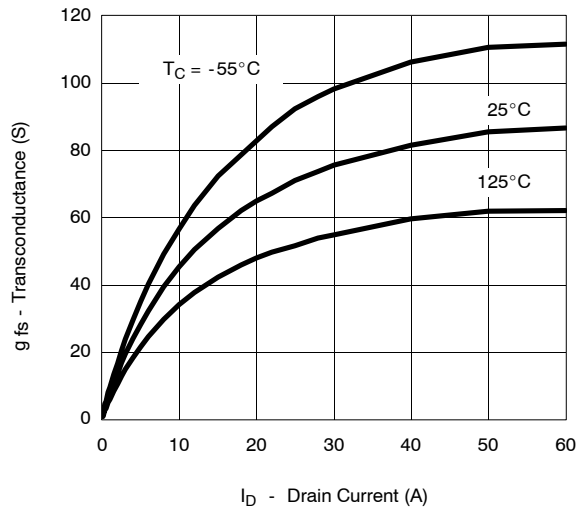
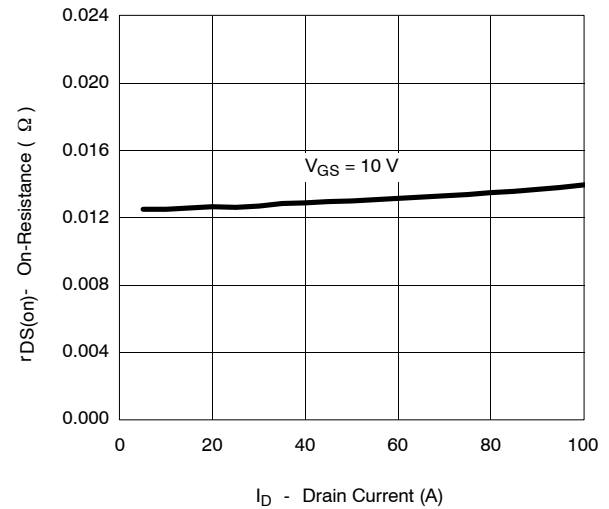
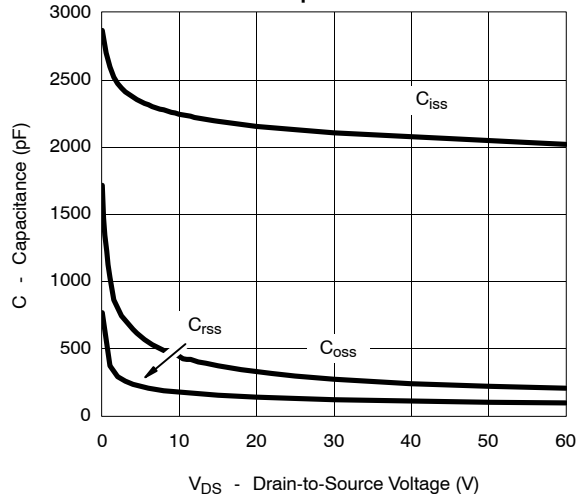
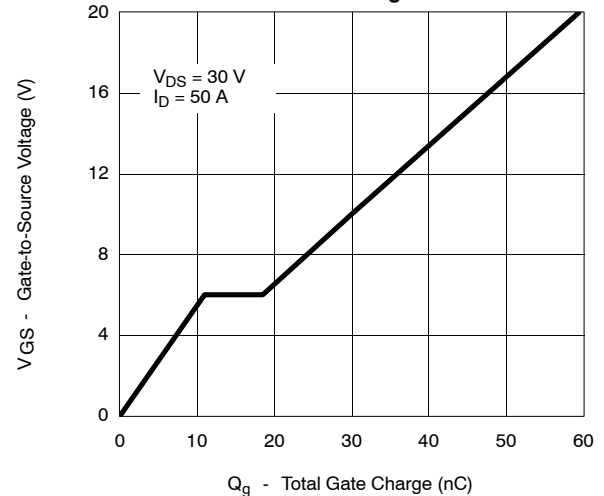
## Notes

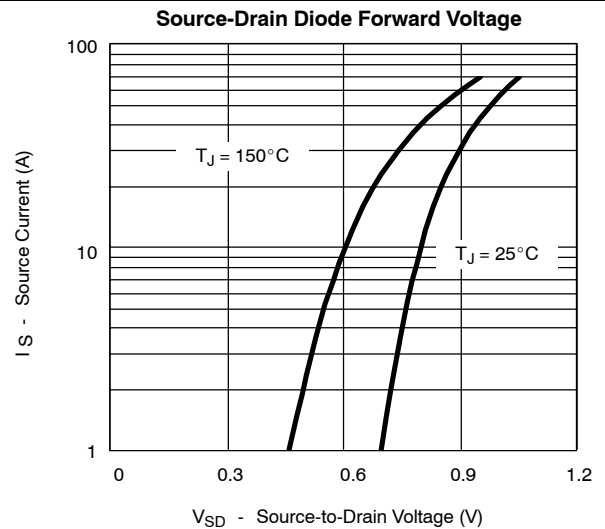
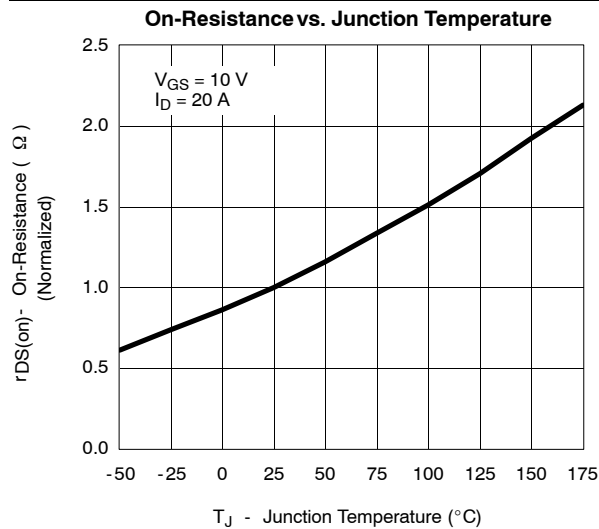
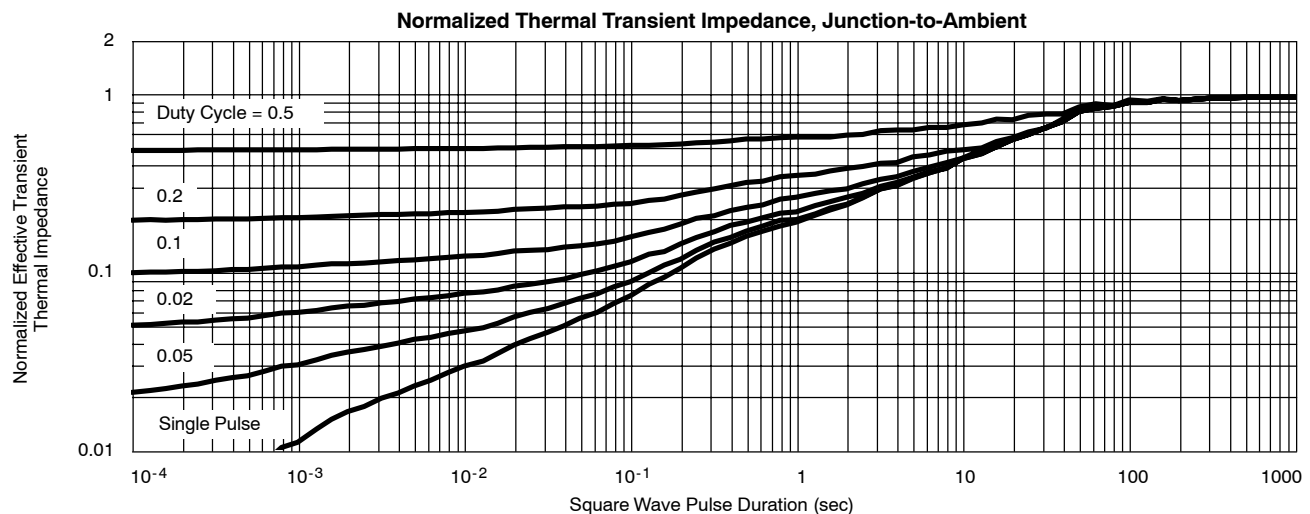
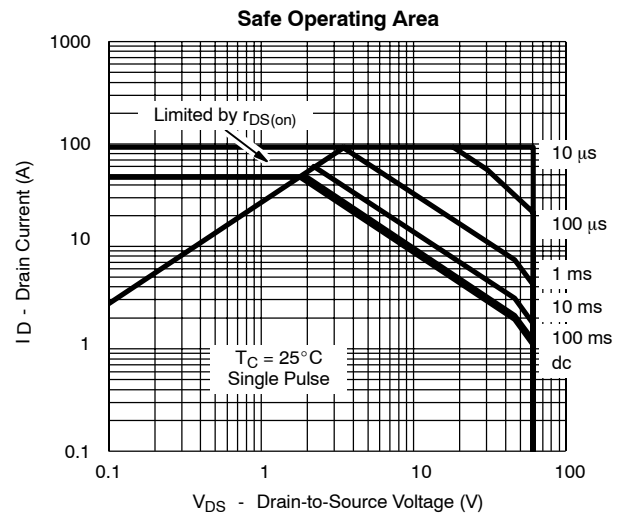
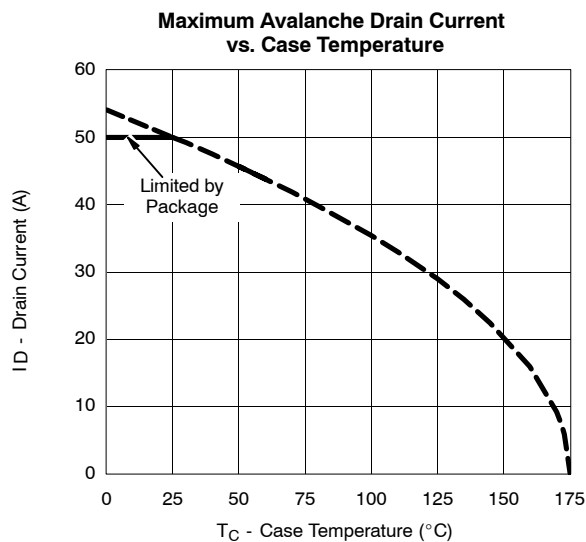
- Surface Mounted on 1" x 1" FR4 Board.
- See SOA curve for voltage derating.
- Calculate continuous current based on maximum allowable junction temperature when using infinite heat sink. Package limitation current is 50 A.

SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ <sup>a</sup>	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	2.0		4.0	
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>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V	50			A
Drain-Source On-State Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		0.0128	0.016	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C			0.027	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 175 °C			0.032	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A		20		S
Dynamic <sup>a</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, F = 1 MHz		2100		pF
Output Capacitance	C <sub>Oss</sub>			300		
Reverse Transfer Capacitance	C <sub>rss</sub>			125		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.7		Ω
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> = 50 A		30	45	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			11		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			8		
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 30 V, R <sub>L</sub> = 0.6 Ω I <sub>D</sub> ≅ 50 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 2.5 Ω		10	15	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			12	20	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			20	30	
Fall Time <sup>c</sup>	t <sub>f</sub>			10	15	
Source-Drain Diode Ratings and Characteristic (T <sub>C</sub> = 25 °C)						
Pulsed Current	I <sub>SM</sub>				100	A
Diode Forward Voltage <sup>b</sup>	V <sub>SD</sub>	I <sub>F</sub> = 30 A, V <sub>GS</sub> = 0 V		1.0	1.5	V
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 50 A, di/dt = 100 A/μs		50	85	ns

## Notes

- a. Guaranteed by design, not subject to production testing.  
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.  
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)****THERMAL RATINGS**



**THERMAL RATINGS**

