



New Product

SUM60N04-06T

Vishay Siliconix

N-Channel 40-V (D-S) MOSFET with Sensing Diode

PRODUCT SUMMARY

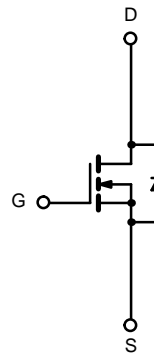
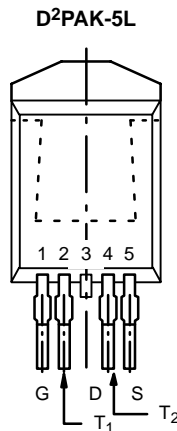
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.0055 @ $V_{GS} = 10$ V	60 ^a

FEATURES

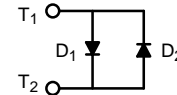
- TrenchFET® Power MOSFETS Plus Temperature Sensing Diode
- 175°C Junction Temperature
- New Low Thermal Resistance Package

APPLICATIONS

- Automotive
- Industrial



N-Channel MOSFET



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

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	40	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 175^\circ\text{C}$) ^d	I_D	$T_C = 25^\circ\text{C}$	60 ^a	A
		$T_C = 100^\circ\text{C}$	60 ^a	
Pulsed Drain Current	I_{DM}	250		
Continuous Diode Current (Diode Conduction) ^d	I_S	60 ^a		
Avalanche Current	I_{AR}	60 ^a		
Repetitive Avalanche Energy ^b	E_{AR}	180	mJ	
Maximum Power Dissipation ^a	P_D	$T_C = 25^\circ\text{C}$	200 ^c	W
		$T_A = 25^\circ\text{C}$	3.75 ^d	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient ^d	R_{thJA}	40	$^\circ\text{C}/\text{W}$
Junction-to-Case	R_{thJC}	0.75	

Notes

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

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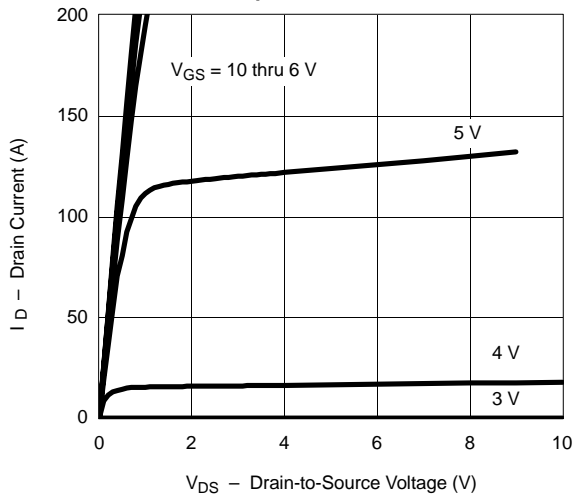
MOSFET SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	40			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _{DS} = 250 μA	2			
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 32 V, V _{GS} = 0 V			1	μA
		V _{DS} = 32 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 32 V, V _{GS} = 0 V, T _J = 175 °C			500	
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 = 25 A		0.0044	0.0055	Ω
		V _{GS} = 10 V, I _D = 25 A, T _J = 125 °C			0.0088	
		V _{GS} = 10 V, I _D = 25 A, T _J = 175 °C			0.011	
Sense Diode Forward Voltage	V _{FD1}	I _F = 50 μA	655		715	mV
	V _{FD2}	I _F = 25 μA	600		660	
Sense Diode Forward Voltage Increase	ΔV _F	From I _F = 25 μA to I _F = 50 μA	30		80	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A		35		S
Dynamic^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		6400		pF
Output Capacitance	C _{oss}			1100		
Reverse Transfer Capacitance	C _{rss}			630		
Total Gate Charge ^c	Q _g	V _{DS} = 20 V, V _{GS} = 10 V, I _D = 25 A		115	150	nC
Gate-Source Charge ^c	Q _{gs}			35		
Gate-Drain Charge ^c	Q _{gd}			35		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 0.8 Ω I _D = 25 A, V _{GEN} = 10 V, R _G = 2.5 Ω		15	20	ns
Rise Time ^c	t _r			150	210	
Turn-Off Delay Time ^c	t _{d(off)}			60	85	
Fall Time ^c	t _f			80	110	
Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^b						
Continuous Current	I _s				60	A
Pulsed Current	I _{SM}				200	
Forward Voltage ^a	V _{SD}	I _F = 60 A, V _{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 60 A, di/dt = 100 A/μs		45	70	ns
Peak Reverse Recovery Current	I _{RM(REC)}			2.5	5	A
Reverse Recovery Charge	Q _{rr}			0.06	0.18	μC

Notes:

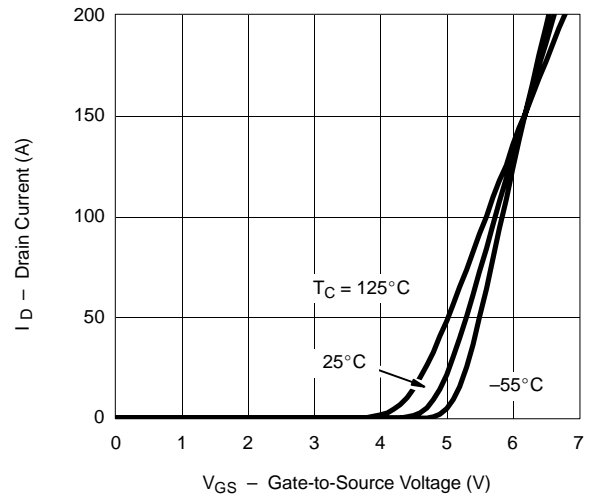
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

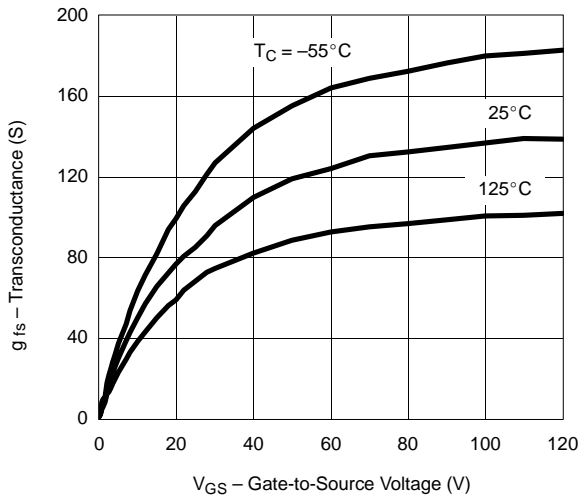
Output Characteristics



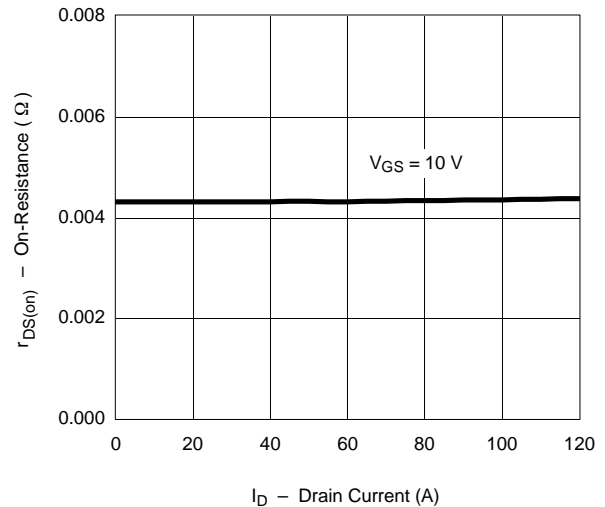
Transfer Characteristics



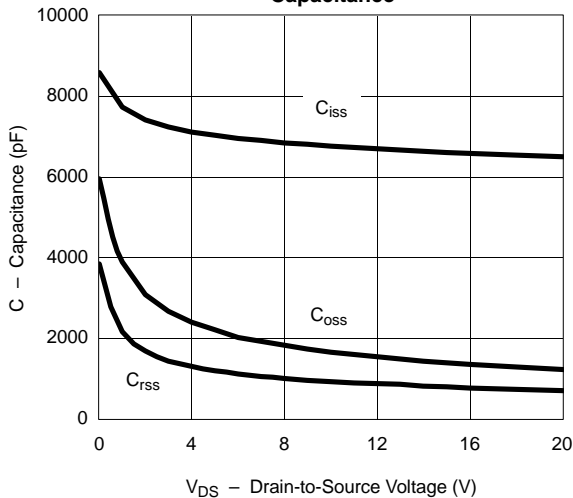
Transconductance



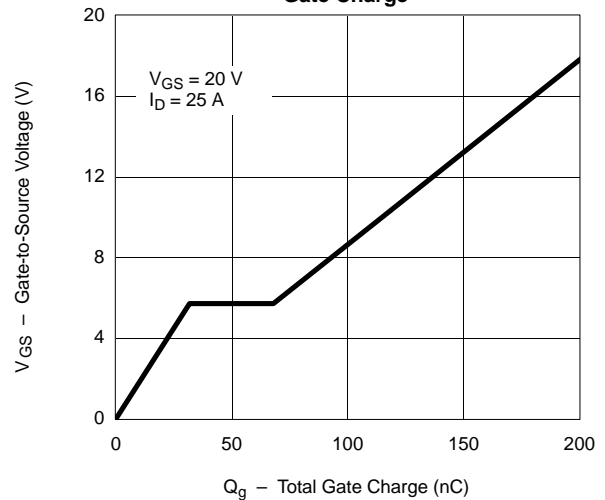
On-Resistance vs. Drain Current



Capacitance



Gate Charge



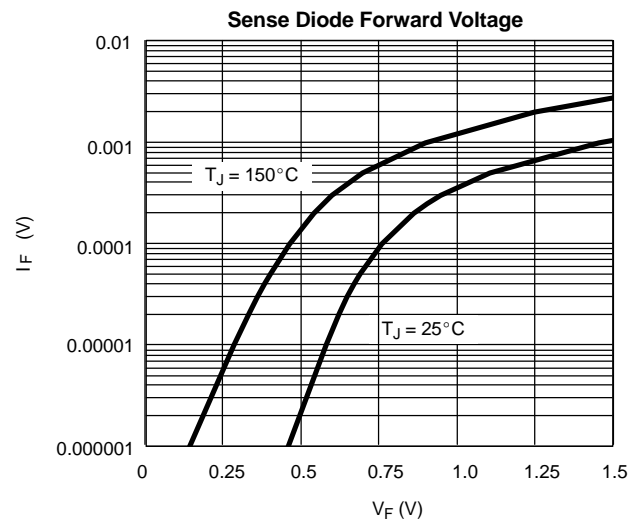
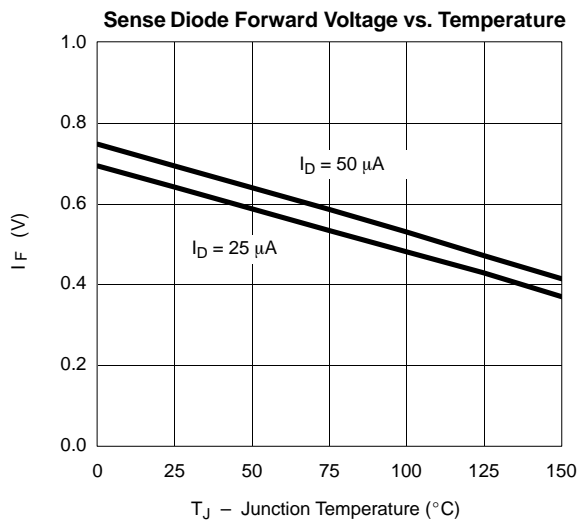
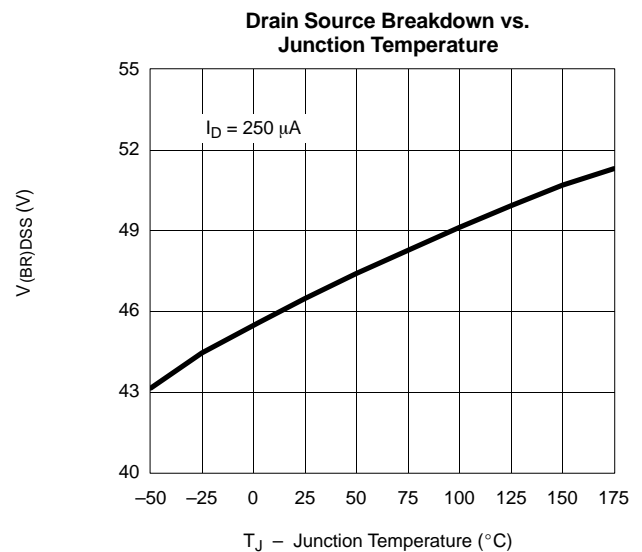
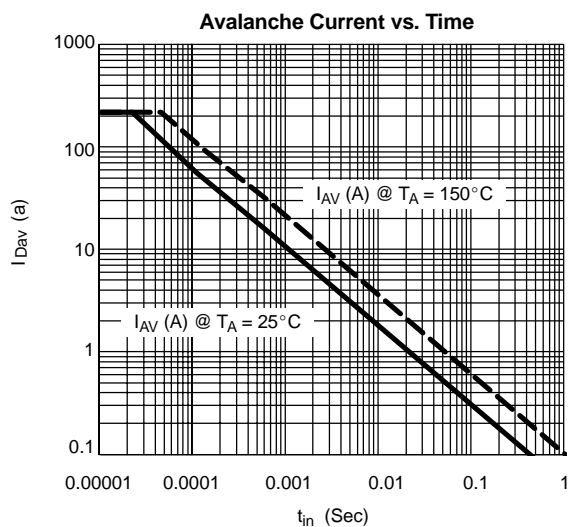
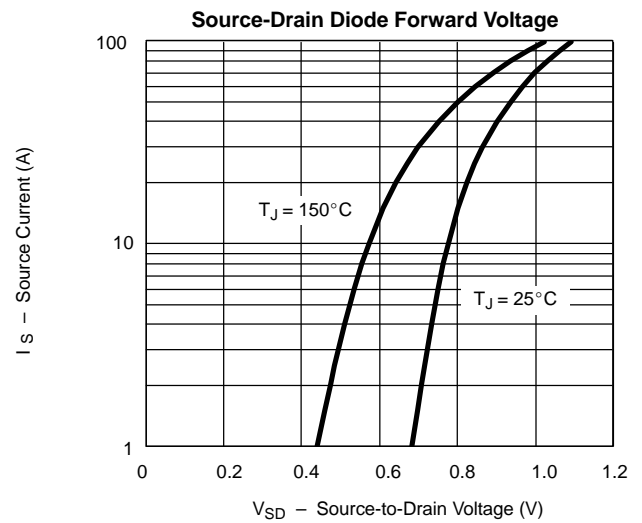
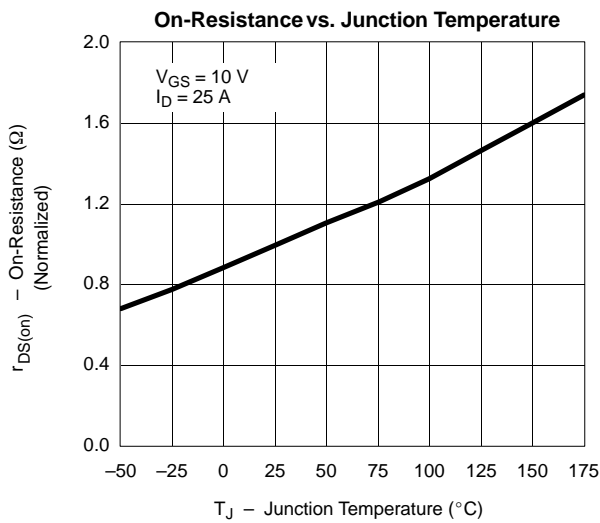
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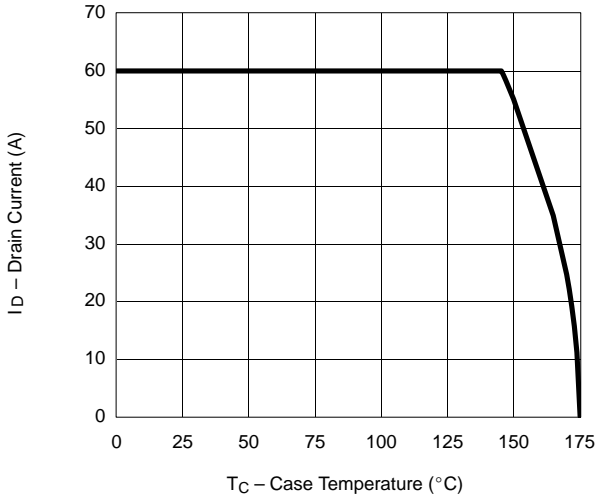
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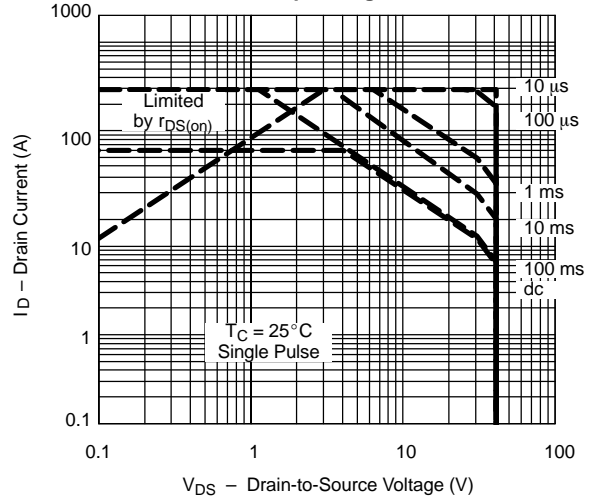


THERMAL RATINGS

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

