

P-Channel 55-V (D-S) MOSFET with Sensing Diode

PRODUCT SUMMARY

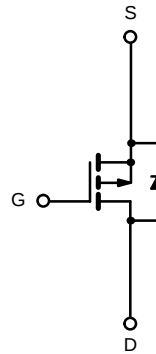
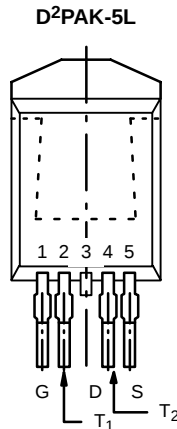
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
-55	0.011 @ $V_{GS} = -10$ V	-60 ^a
	0.0175 @ $V_{GS} = -4.5$ V	-60 ^a

FEATURES

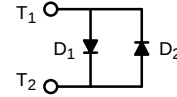
- TrenchFET® Power MOSFETS Plus Temperature Sensing Diode
- 175°C Junction Temperature
- New Low Thermal Resistance Package

APPLICATIONS

- Automotive
- Industrial



P-Channel MOSFET



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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	-55	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 175^\circ\text{C}$) ^d	$T_C = 25^\circ\text{C}$	I_D	-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	$T_C = 25^\circ\text{C}$	P_D	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	PCB Mount ^d	R_{thJA}	40	$^\circ\text{C/W}$
Junction-to-Case		R_{thJC}	0.75	

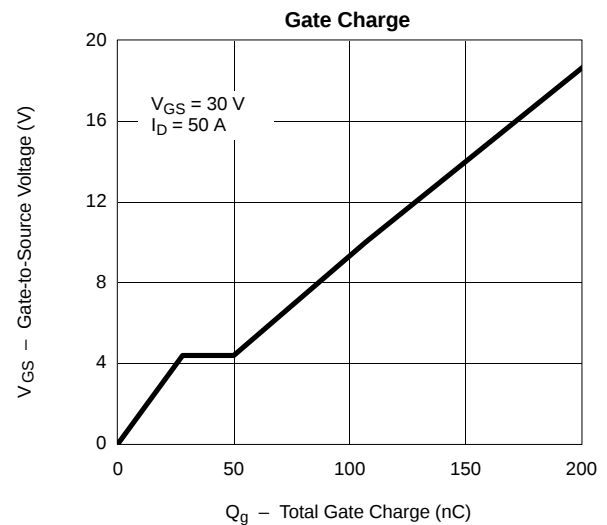
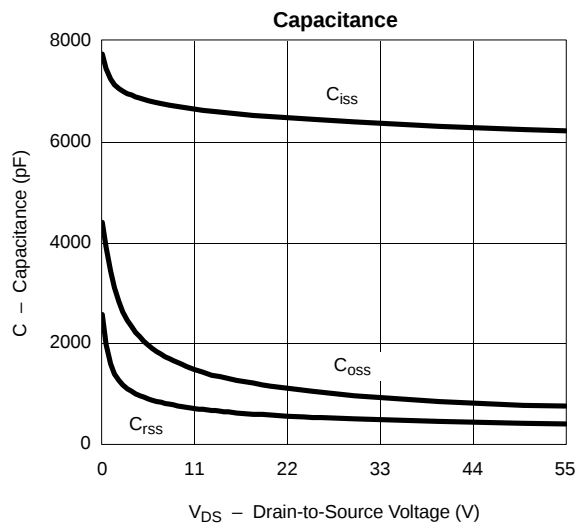
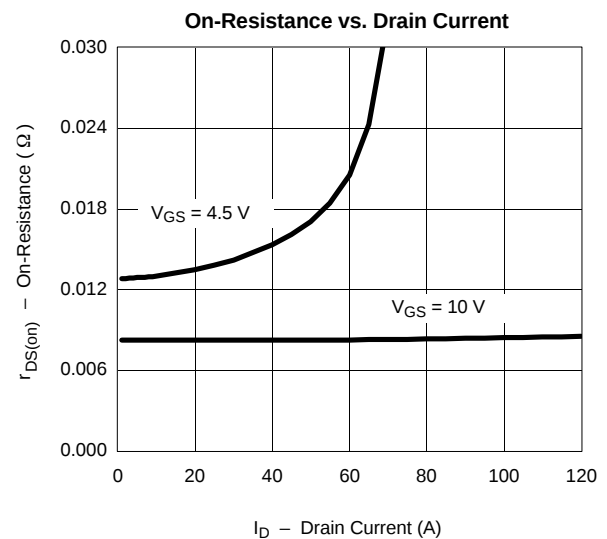
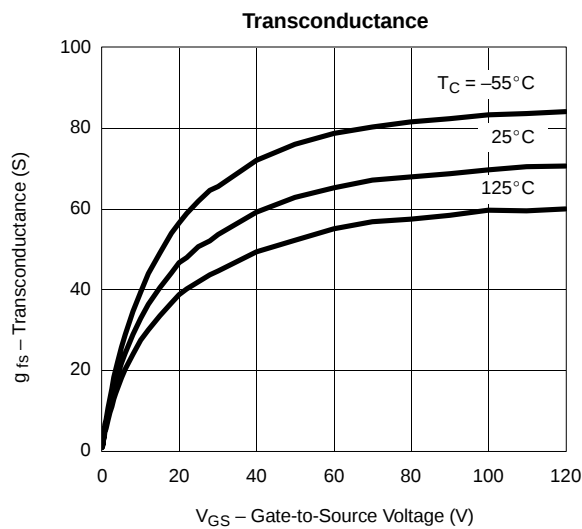
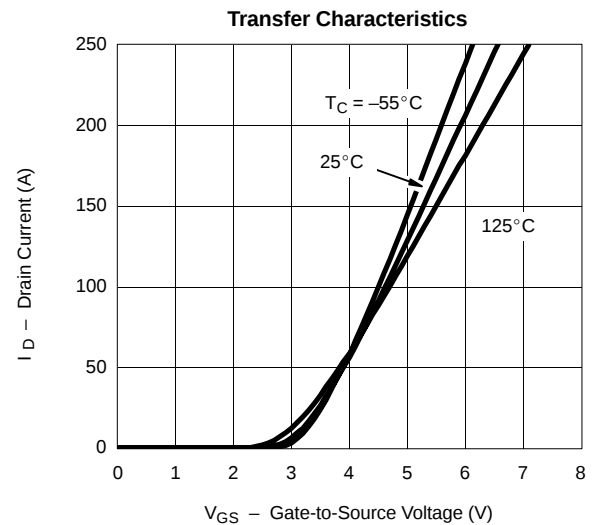
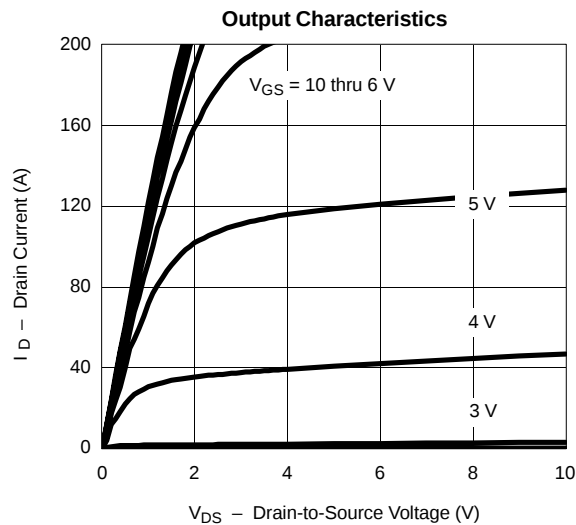
Notes

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

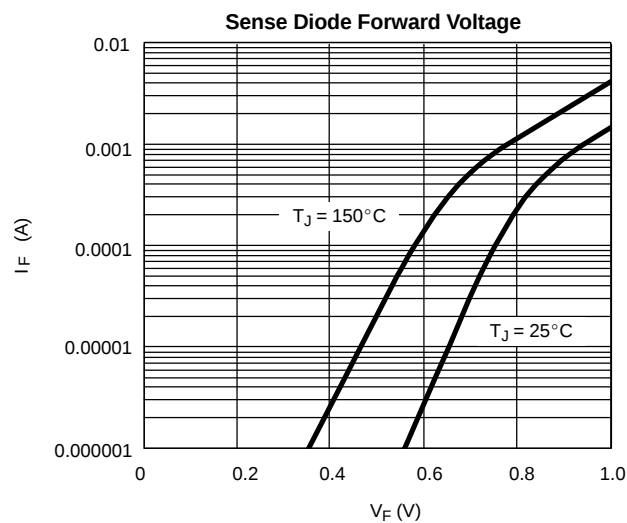
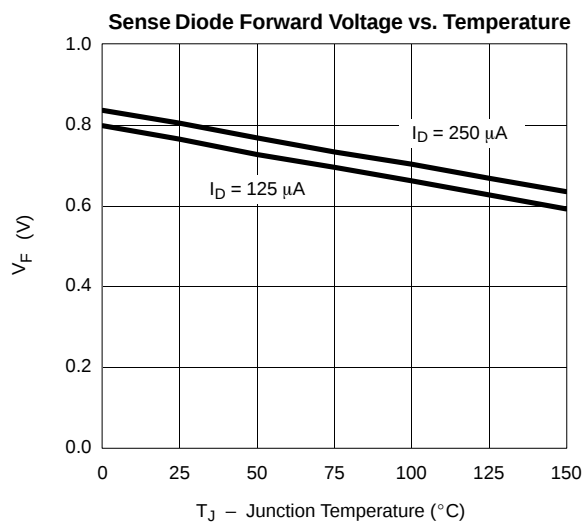
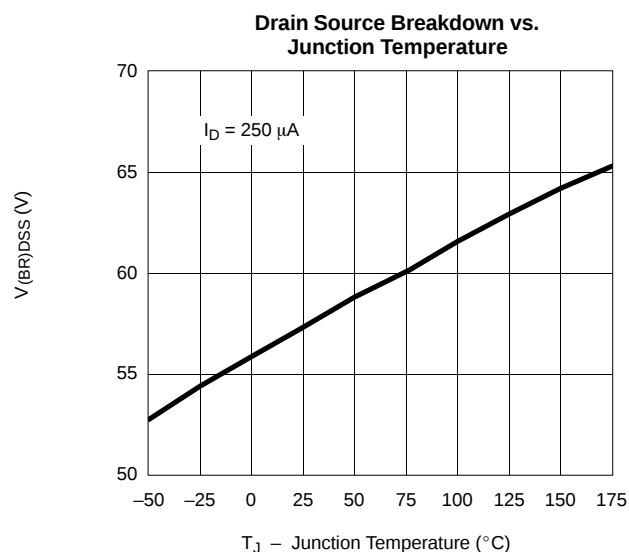
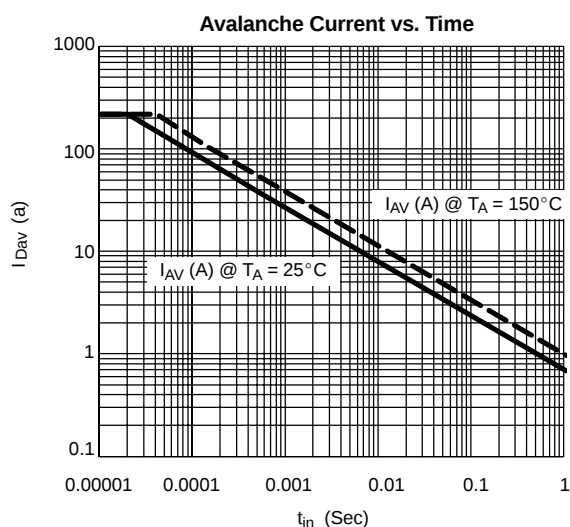
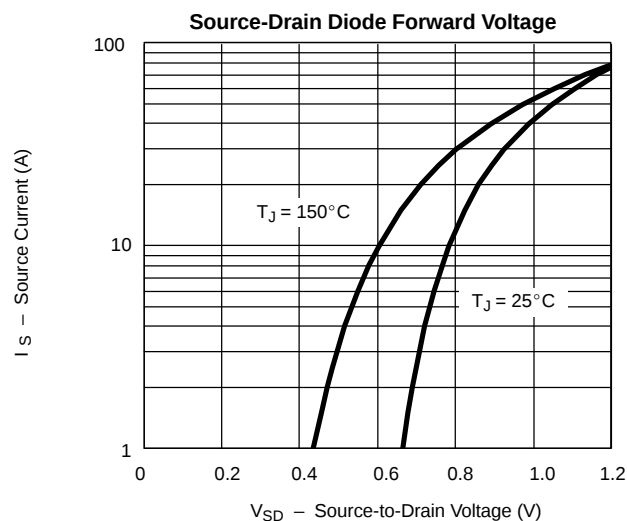
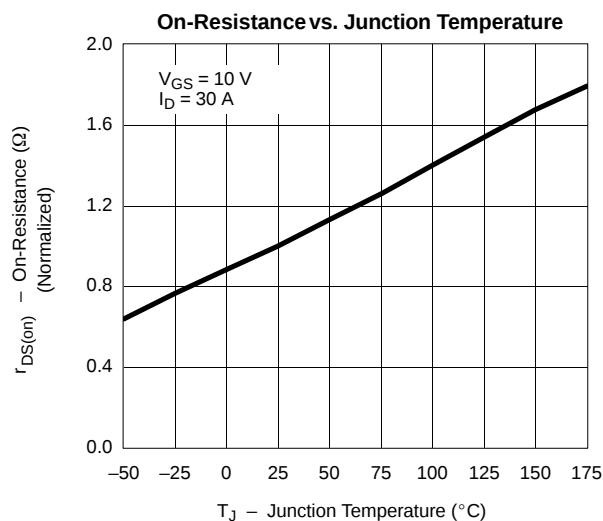
MOSFET SPECIFICATIONS (T _J =25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = −250 μA	−55			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _{DS} = −250 μA	−1			
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = −44 V, V _{GS} = 0 V			−1	μA
		V _{DS} = −44 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		0.009	0.011	Ω
		V _{GS} = −10 V, I _D = −30 A, T _J = 125 °C			0.0175	
		V _{GS} = −10 V, I _D = −30 A, T _J = 175 °C			0.022	
		V _{GS} = −4.5 V, I _D = −20 A			0.0175	
Sense Diode Forward Voltage	V _{FD}	V _{DS} = −25 V, I _F = −250 μA	−770		−830	mV
Sense Diode Forward Voltage Increase	ΔV _F	From I _F = −125 μA to I _F = −250 μA	−25		−55	
Forward Transconductance ^a	g _{fs}	V _{DS} = −25 V, I _D = −30 A		50		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = −25 V, f = 1 MHz		6450	160	pF
Output Capacitance	C _{oss}			1050		
Reverse Transfer Capacitance	C _{rss}			520		
Total Gate Charge ^c	Q _g	V _{DS} = −30 V, V _{GS} = −10 V, I _D = −60 A		107		nC
Gate-Source Charge ^c	Q _{gs}			28		
Gate-Drain Charge ^c	Q _{gd}			22		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = −30 V, R _L = 0.6 Ω I _D = −60 A, V _{GEN} = −10 V, R _G = 2.5 Ω		15	25	ns
Rise Time ^c	t _r			190	325	
Turn-Off Delay Time ^c	t _{d(off)}			145	220	
Fall Time ^c	t _f			265	450	
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		−1.1	−1.5	V
Reverse Recovery Time	t _{rr}	I _F = −60 A, di/dt = 100 A/μs		55	110	ns
Peak Reverse Recovery Current	I _{RM(REC)}			−1.6	−2.0	A
Reverse Recovery Charge	Q _{rr}				0.04	12

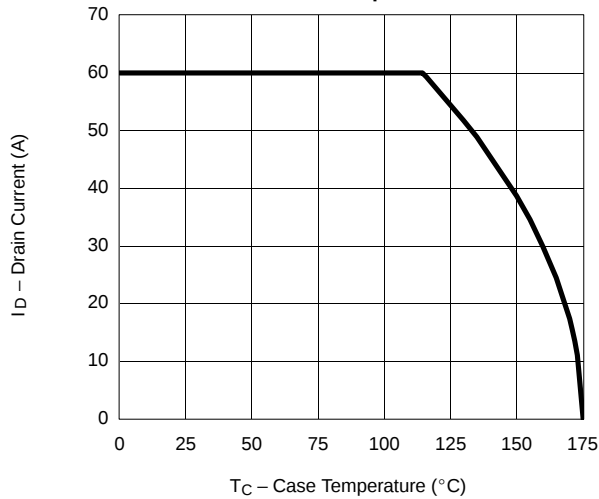
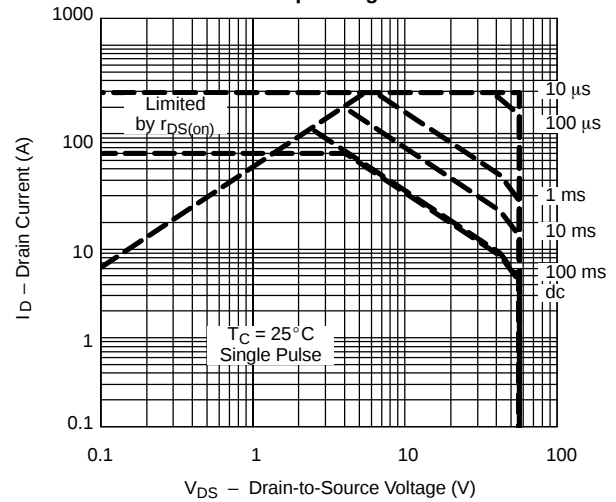
Notes:

- 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)**

TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



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