N-Channel 75-V (D-S) MOSFET with Sensing Diode

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
75	0.007 @ V_{GS} = 10 V	60[a]

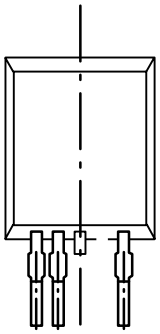
FEATURES

- TrenchFET® Power MOSFET Plus Temperature Sensing Diode
- New Low Thermal Resistance Package

APPLICATIONS

- Automotive
- Industrial

D^2PAK-5L

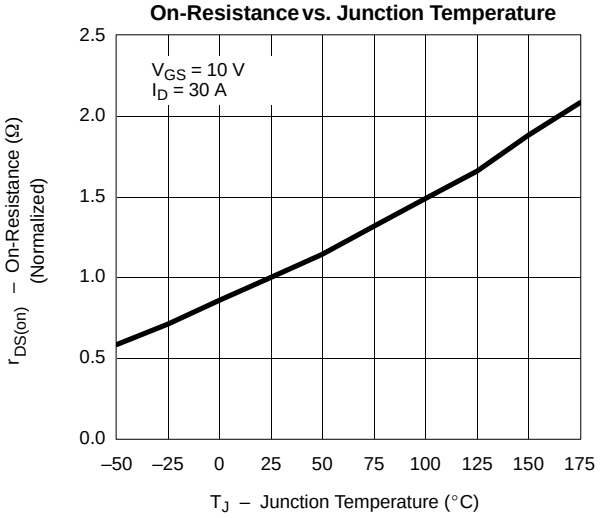


MOSFET SPECIFICATIONS (T_J = 25°C NLESS OTHER ISE NOTED)						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typ**	**Max**	**Unit**
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	75			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 250 μA	2		4	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V			1	μA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 60 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		0.0054	0.007	Ω
		V_{GS} = 10 V, I_D = 25 A, T_J = 125°C			0.010	
		V_{GS} = 10 V, I_D = 25 A, T_J = 175°C			0.013	
Sense Forward Voltage	V_{FD1}	I_F = 50 μA	710		770	mV
	V_{FD2}	I_F = 25 μA	640		700	
Sense Diode Forward Voltage Increase	ΔV_F	From I_F = 25 μA to I_F = 50 μA	40		100	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 20 A		100		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		6500		pF
Output Capacitance	C_{oss}			920		
Reversen Transfer Capacitance	C_{rss}			400		
Total Gate Charge[c]	Q_g	V_{DS} = 35 V, V_{GS} = 10 V, I_D = 60 A		110	150	nC
Gate-Source Charge[c]	Q_{gs}			30		
Gate-Drain Charge[c]	Q_{gd}			30		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 35 V, R_L = 0.6 Ω I_D ≃ 60 A, V_{GEN} = 10 V, R_G = 2.5 Ω		15	20	ns
Rise Time[c]	t_r			130	200	
Turn-Off Delay Time[c]	$t_{d(off)}$			75	115	
Fall Time[c]	t_f			120	180	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_s				60	A
Pulsed Current	I_{SM}				240	
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		75	115	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			3.5	5	A
Reverse Recovery Charge	Q_{rr}			0.13	0.29	μC

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.

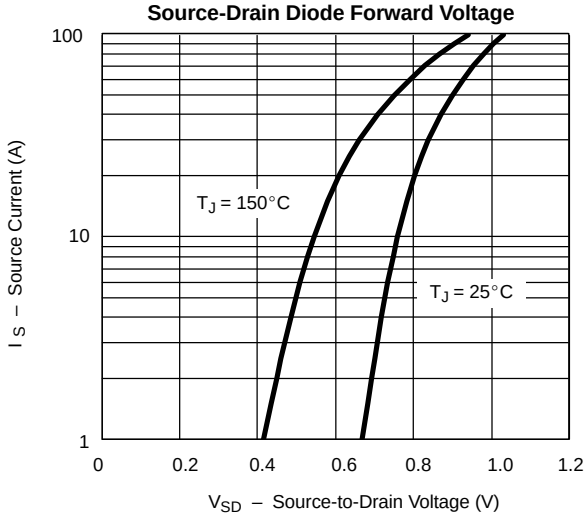
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

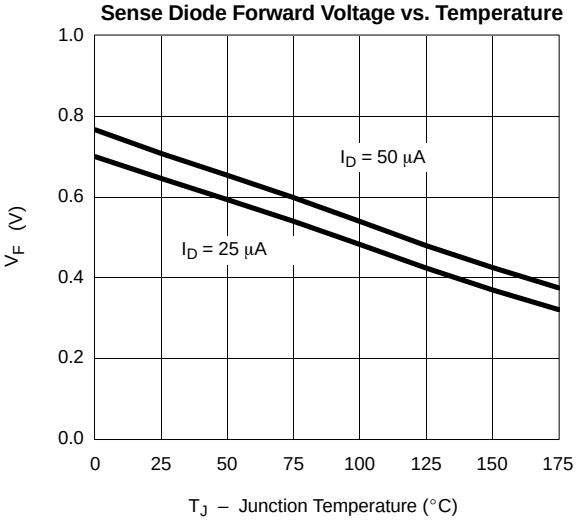


Drain Source Breakdown vs. Junction Temperature

Source-Drain Diode Forward Voltage

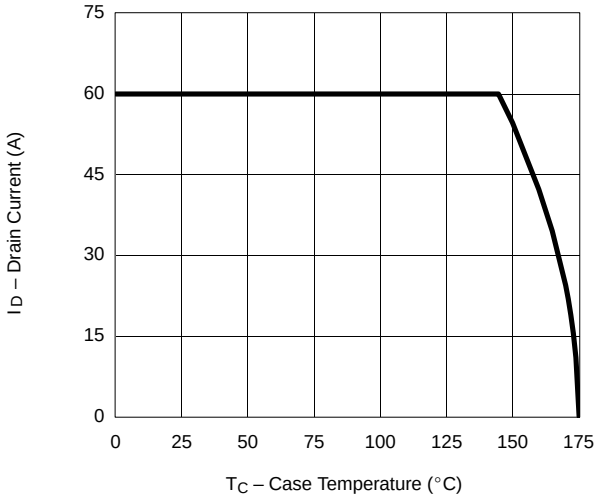


Sense Diode Forward Voltage vs. Temperature

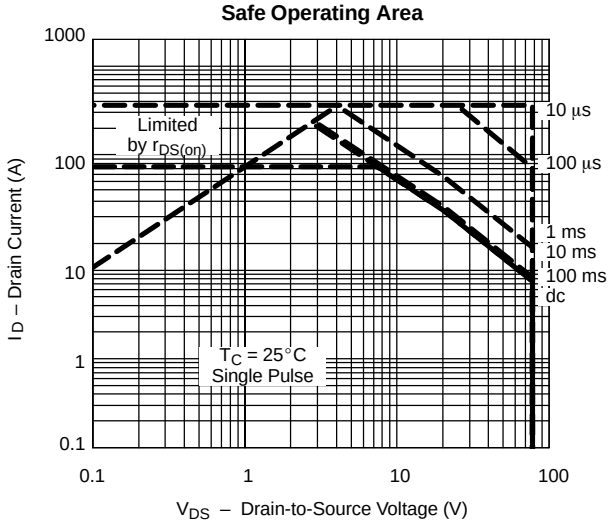


THERMAL RATINGS

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case