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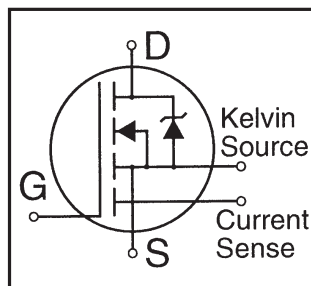
International **IR** Rectifier

PD - 9.615A

IRCZ24

HEXFET® Power MOSFET

- Dynamic dv/dt Rating
- Current Sense
- 175°C Operating Temperature
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements



$$V_{DSS} = 55V$$

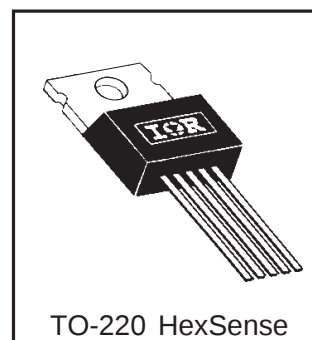
$$R_{DS(on)} = 0.040\Omega$$

$$I_D = 26A$$

Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device, low on-resistance and cost-effectiveness.

The HEXSense device provides an accurate fraction of the drain current through the additional two leads to be used for control or protection of the device. These devices exhibit similar electrical and thermal characteristics as their IRF-series equivalent part numbers. The provision of a kelvin source connection effectively eliminates problems of common source inductance when the HEXSense is used as a fast, high-current switch in non current-sensing applications.



Absolute Maximum Ratings

Parameter		Max.	Units
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V	17	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10V	12	
I_{DM}	Pulsed Drain Current ①	68	
P_D @ $T_C = 25^\circ C$	Power Dissipation	60	W
	Linear Derating Factor	0.40	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	6.0	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.5	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or screw	10 lbf•in (1.1 N•m)	

Thermal Resistance

	Parameter	Min.	Max.	Units	
$R_{\theta JC}$	Junction-to-Case	—	—	2.5	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	62	

**When mounted on FR-4 board using minimum recommended footprint. For recommended footprint and soldering techniques refer to application note #AN-994.

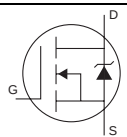
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Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter		Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	60	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.061	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(ON)}	Static Drain-to-Source On-Resistance	—	—	0.10	Ω	V _{GS} = 10V, I _D = 10A④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 250μA
g _{fs}	Forward Transconductance	5.8	—	—	S	V _{DS} = 25V, I _D = 10A
I _{DSS}	Drain-to-Source Leakage Current	—	—	25		V _{DS} = 60V, V _{GS} = 0V
		—	—	250		V _{DS} = 48V, V _{GS} = 0V, T _J = 150°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100		V _{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V _{GS} = -20V
Q _g	Total Gate Charge	—	—	24		I _D = 17A
Q _{gs}	Gate-to-Source Charge	—	—	6.3	nC	V _{DS} = 48V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	—	9.0		V _{GS} = 10V, See Fig. 6 and 13 ④
t _{d(on)}	Turn-On Delay Time	—	12	—		V _{DD} = 30V
t _r	Rise Time	—	59	—		I _D = 17A
t _{d(off)}	Turn-Off Delay Time	—	25	—		R _G = 18Ω
t _f	Fall Time	—	38	—		R _D = 1.7Ω, See Fig. 10 ④
L _D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6 mm (0.25 in.) from package and center of die contact
L _C	Internal Source Inductance	—	7.5	—		
C _{iss}	Input Capacitance	—	720	—		V _{GS} = 0V
C _{oss}	Output Capacitance	—	360	—	pF	V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	75	—		f = 1.0MHz, See Fig. 5
r	Current Sensing Ratio	740	—	820	—	I _D = 17A, V _{GS} = 10V
C _{oss}	Output Capacitance of Sensing Cells	—	14	—	pF	V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	17	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	68		
V _{SD}	Diode Forward Voltage	—	—	1.5	V	T _J = 25°C, I _S = 17A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	87	180	ns	T _J = 25°C, I _F = 17A
Q _{rr}	Reverse Recovery Charge	—	0.29	0.60	nC	di/dt = 100A/μs ④
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

③ $I_{SD} \leq 17A, di/dt \leq 140A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^\circ\text{C}$

② $V_{DD} = 25V$, starting $T_J = 25^\circ\text{C}$, $L = 0.024mH$
 $R_G = 25\Omega, I_{AS} = 17A$. (See Figure 12)

④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

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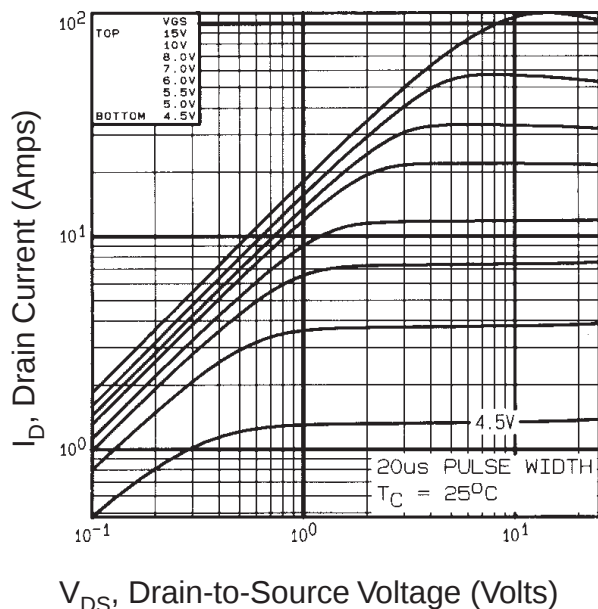


Fig. 1 Typical Output Characteristics,
 $T_C = 25^\circ\text{C}$

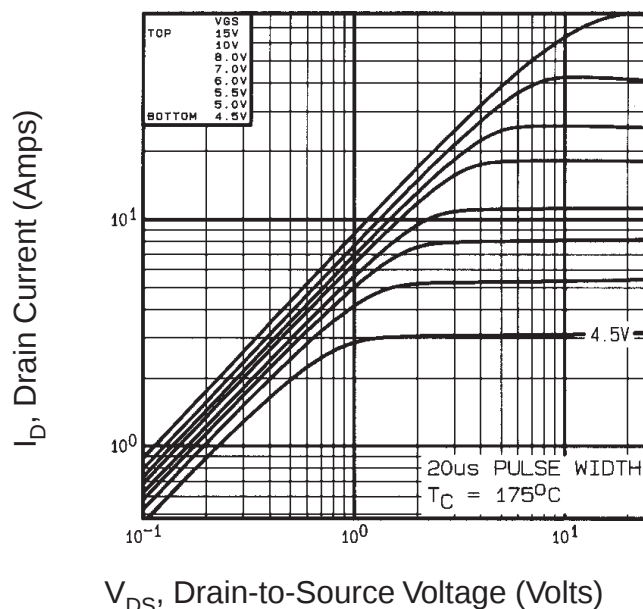


Fig. 2 Typical Output Characteristics,
 $T_C = 175^\circ\text{C}$

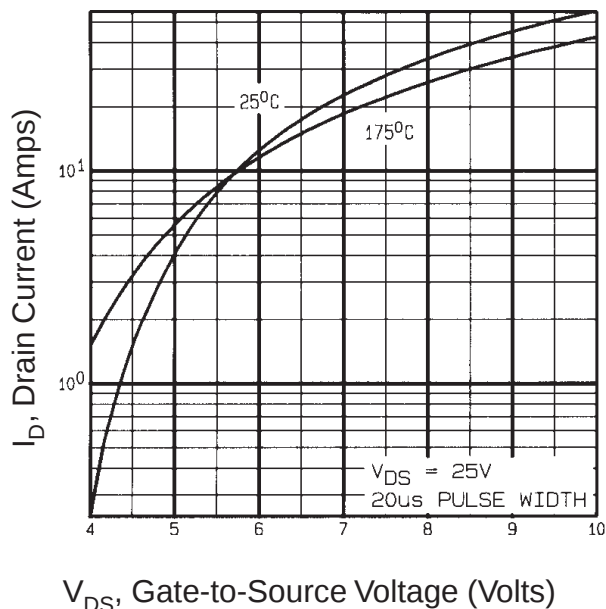


Fig. 3 Typical Transfer Characteristics

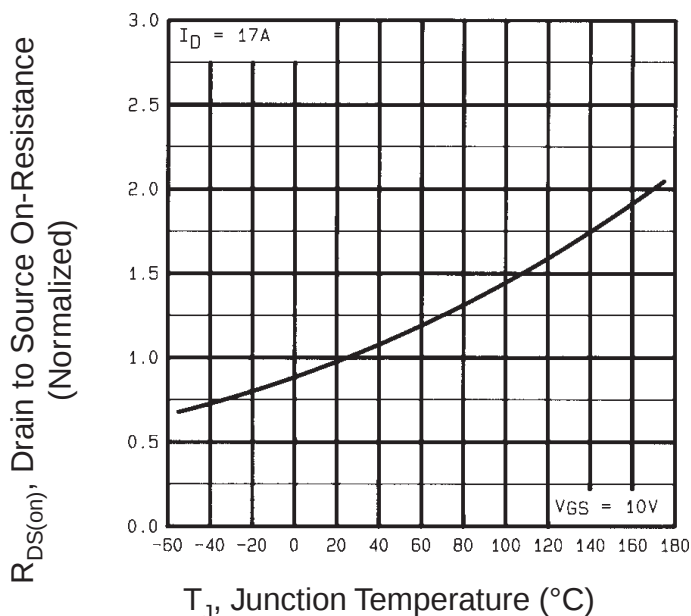
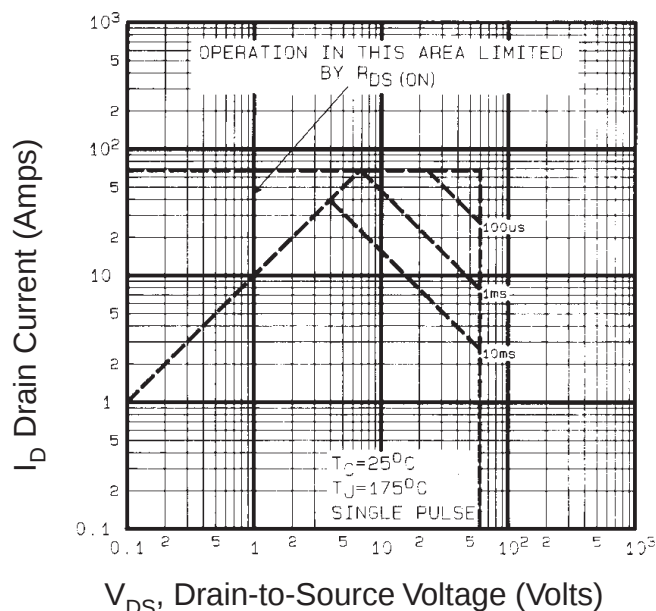
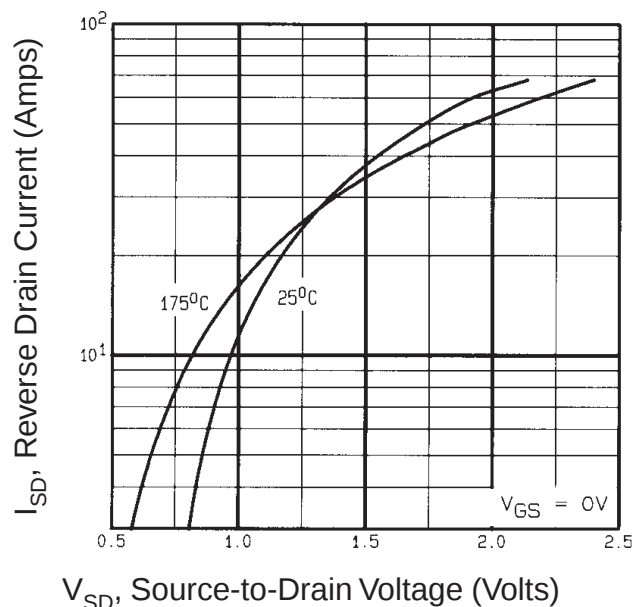
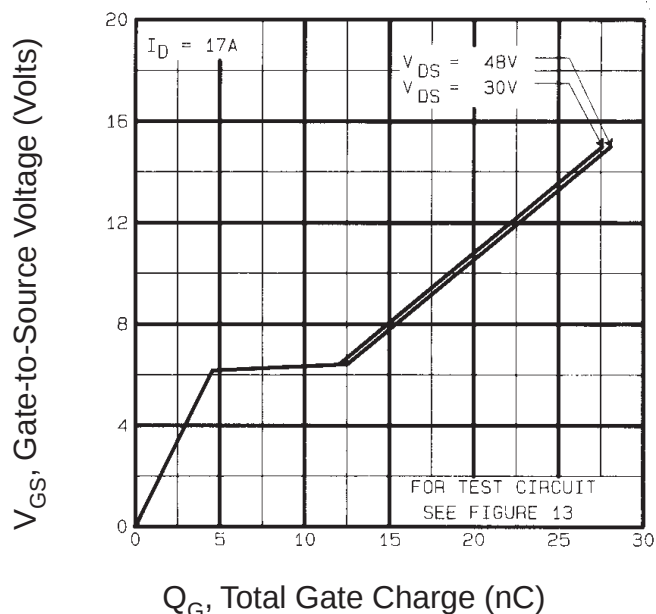
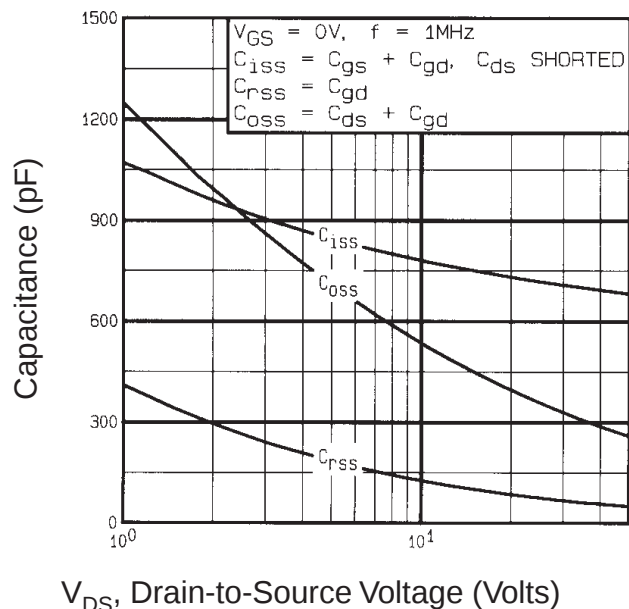


Fig. 4 Normalized On-Resistance vs.
Temperature

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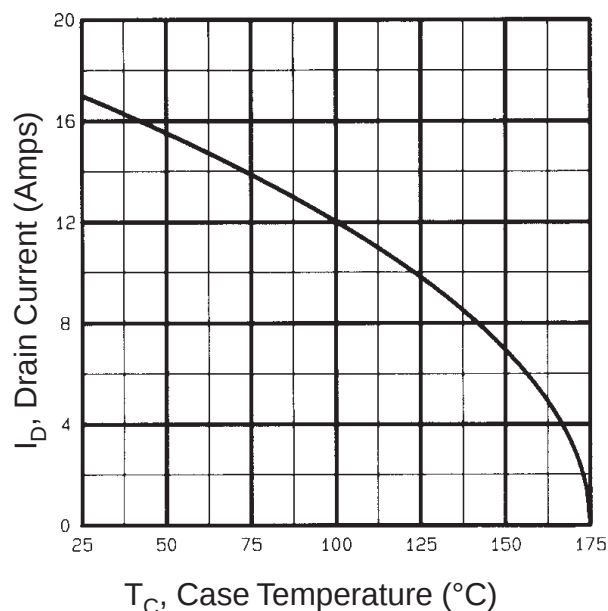


Fig. 9 Maximum Drain Current vs. Case Temperature

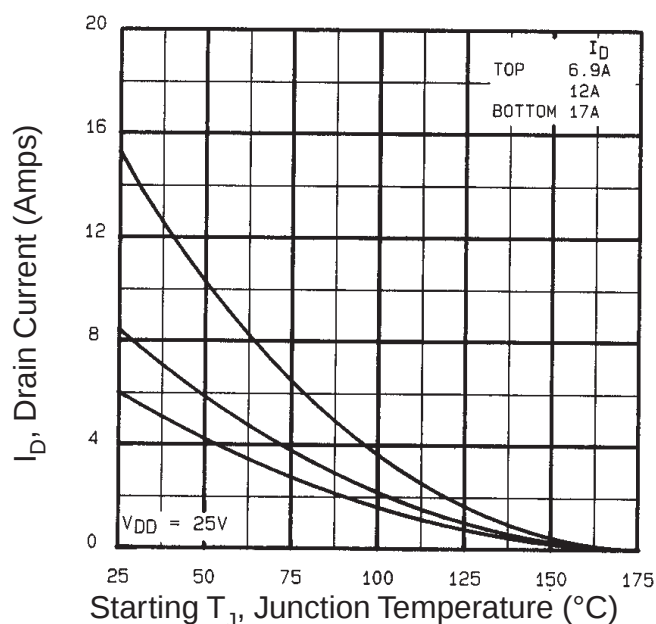


Fig. 12c Maximum Avalanche Energy vs. Drain Current

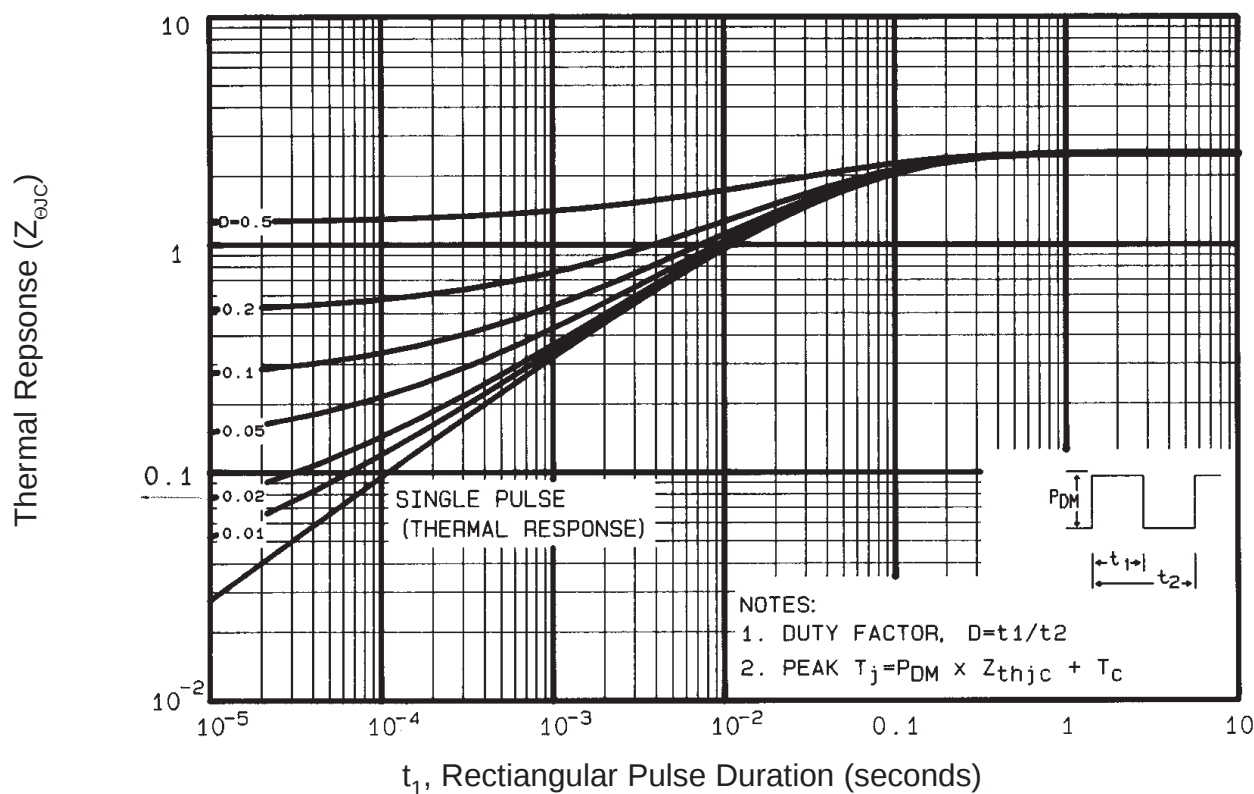


Fig. 11 Maximum Effective Transient Thermal Impedance, Junction-to-Case

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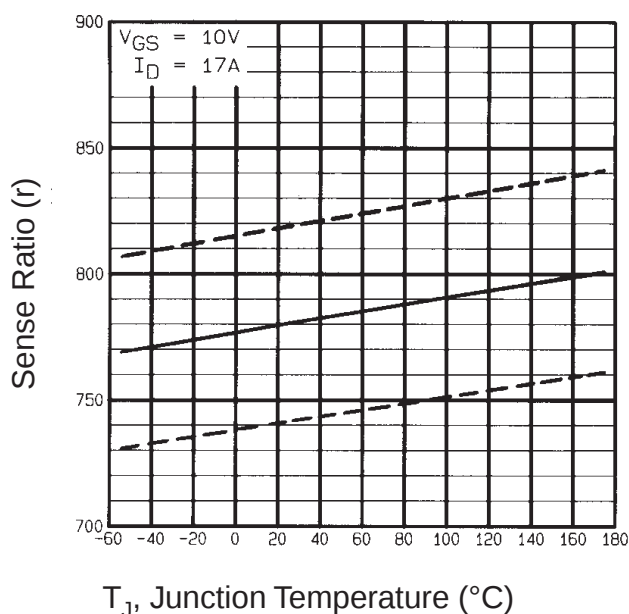


Fig. 15 Typical HEXSense Ratio vs. Junction Temperature

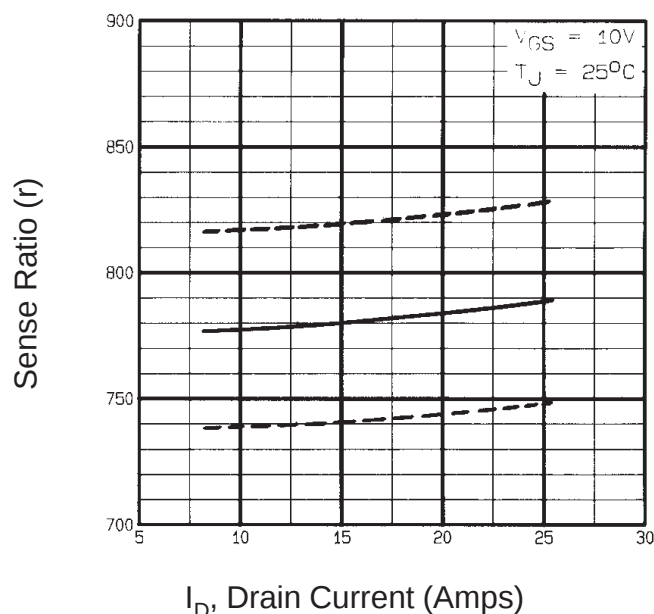


Fig. 16 Typical HEXSense Ratio vs. Drain Current

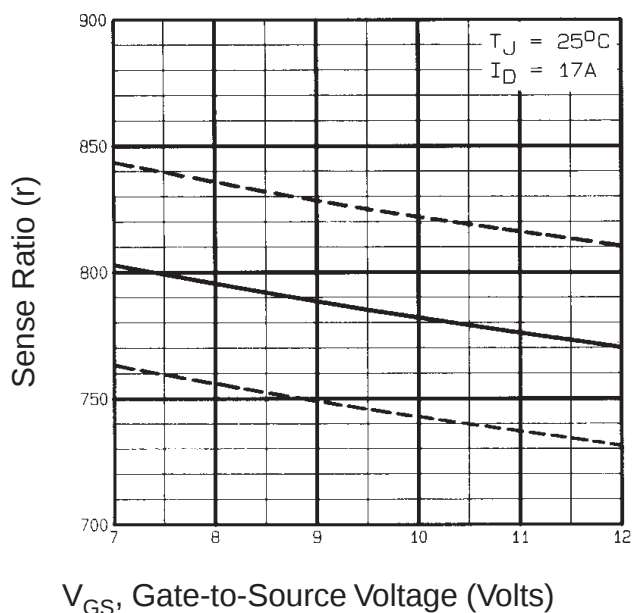
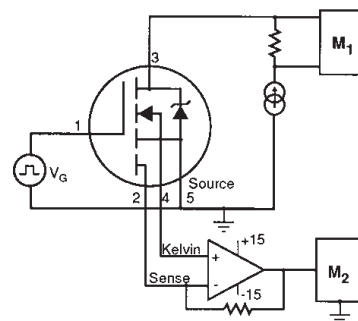


Fig. 17 Typical HEXSense Ratio vs. Gate Voltage

Mechanical drawings, Appendix A
Part marking information, Appendix B
Test Circuit diagrams, Appendix C

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M1, M2 = HIGH SPEED DIGITAL VOLTMETERS

Fig. 18 HEXSense Ratio Test Circuit

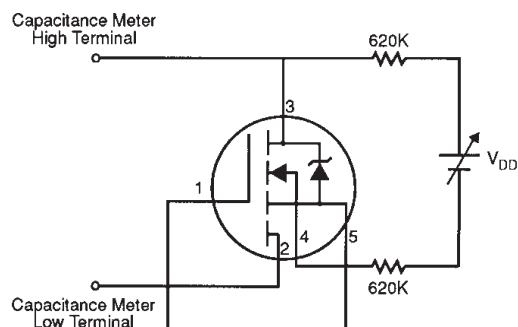


Fig. 19 HEXSense Sensing Cell Output Capacitance Test Circuit