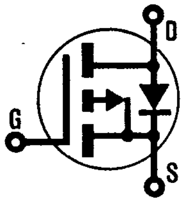
INTERNATIONAL RECTIFIER IOR

HEXFET® TRANSISTORS IRFD9010 IRFD9012

P-CHANNEL HEXDIP™

1-WATT RATED POWER MOSFETs
IN A 4-PIN, DUAL-IN-LINE PACKAGE



4-PIN DIP

-50 Volt, 0.50 Ohm, 1-Watt HEXDIP

The HEXFET® technology is the key to International Rectifier's advanced line of power MOSFET transistors. The efficient geometry and unique processing of the HEXFET design achieve very low on-state resistance combined with high transconductance and extreme device ruggedness.

The P-Channel HEXFETs are designed for application which require the convenience of reverse polarity operation. They retain all of the features of the more common N-Channel HEXFETs such as voltage control, very fast switching, ease of paralleling, and excellent temperature stability.

P-Channels HEXFETs are intended for use in power stages where complementary symmetry with N-Channel devices offers circuit simplification. They are also very useful in drive stages because of the circuit versatility offered by the reverse polarity connection. Applications include motor control, audio amplifiers, switched mode converters, control circuits and pulse amplifiers.

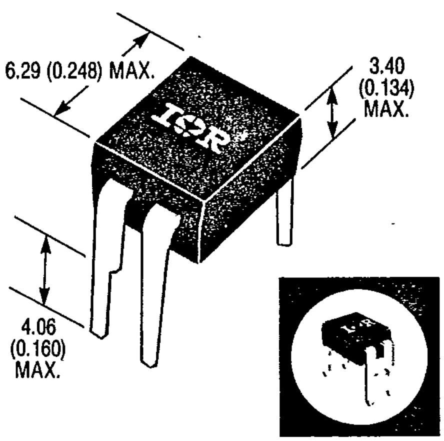
Features

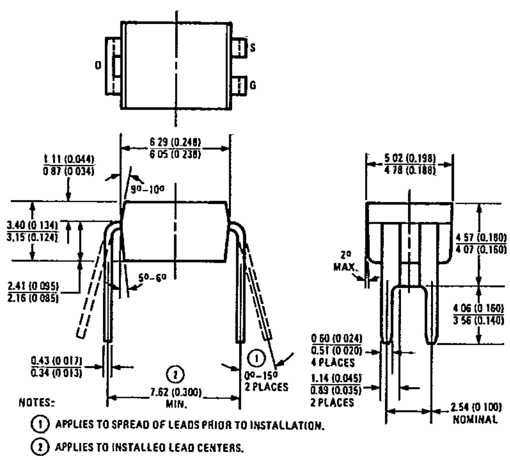
- For Automatic Insertion
- Compact, End Stackable
- Fast Switching
- Low Drive Current
- Easily Paralleled
- Excellent Temperature Stability
- P-Channel Versatility

Product Summary

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFD9010	-50V	0.50Ω	-1.1
IRFD9012	-50V	0.70Ω	-0.91

CASE STYLE AND DIMENSIONS





NOTES:
① APPLIES TO SPREAD OF LEADS PRIOR TO INSTALLATION.
② APPLIES TO INSTALLED LEAD CENTERS.

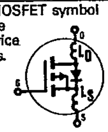
Case Style HD-1 (Similar to JEDEC Outline MO-001AN)
Dimensions in Millimeters and (Inches)

Absolute Maximum Ratings

	Parameter	IRFD9010	IRFD9012	Units
V_{DS}	Drain - Source Voltage ①	−50	−50	V
V_{DGR}	Drain - Gate Voltage (R_{GS} = 20 KΩ) ①	−50	−50	V
I_D @ T_C = 25°C	Continuous Drain Current	−1.1	−0.91	A
I_D @ T_C = 100°C	Continuous Drain Current	−0.68	−0.58	A
I_{DM}	Pulsed Drain Current ②	−8.8	−7.3	A
V_{GS}	Gate - Source Voltage	±20		V
P_D @ T_C = 25°C	Max. Power Dissipation	1		W
	Linear Derating Factor	0.01		W/K ⑤
I_{LM}	Inductive Current, Clamped	−8.8 (See Fig. 14) L = 100μH	−7.3	A
I_L	Unclamped Inductive Current (Avalanche Current) ③	(See Fig. 15) −1.5		A
T_J T_{stg}	Operating Junction and Storage Temperature Range	−55 to 150		°C
	Lead Temperature	300 (0.063 in. (1.6mm) from case for 10s)		°C

Electrical Characteristics @ T_C = 25°C (Unless Otherwise Specified)

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain - Source Breakdown Voltage	IRFD9010	−50	—	—	V	V_{GS} = 0V
		IRFD9012	−50	—	—	V	I_D = −250 μA
$V_{GS(th)}$	Gate Threshold Voltage	ALL	−2.0	—	−4.0	V	V_{DS} = V_{GS}, I_D = −250 μA
I_{GSS}	Gate-Source Leakage Forward	ALL	—	—	−500	nA	V_{GS} = −20V
I_{GSS}	Gate-Source Leakage Reverse	ALL	—	—	500	nA	V_{GS} = 20V
I_{DSS}	Zero Gate Voltage Drain Current	ALL	—	—	−250	μA	V_{DS} = Max. Rating, V_{GS} = 0V
			—	—	−1000	μA	V_{DS} = Max. Rating × 0.8, V_{GS} = 0V, T_C = 125°C
$I_{D(on)}$	On-State Drain Current ④	IRFD9010	−1.1	—	—	A	V_{DS} > $I_{D(on)}$ × $R_{DS(on)}$ max., V_{GS} = 10V
		IRFD9012	−0.91	—	—	A	
$R_{DS(on)}$	Static Drain-Source On-State Resistance ④	IRFD9010	—	0.35	0.50	Ω	V_{GS} = −10V, I_D = −0.58A
		IRFD9012	—	0.50	0.70	Ω	
g_{fs}	Forward Transconductance ④	ALL	1.7	2.5	—	S(℧)	V_{DS} = 2 × V_{GS}, I_{DS} = −2.4A
C_{iss}	Input Capacitance	ALL	—	240	—	pF	V_{GS} = 0V, V_{DS} = −25V, f = 1.0 MHz See Fig. 10
C_{oss}	Output Capacitance	ALL	—	160	—	pF	
C_{rss}	Reverse Transfer Capacitance	ALL	—	30	—	pF	
$t_{d(on)}$	Turn-On Delay Time	ALL	—	6.1	9.2	ns	V_{DD} = −25V, I_D ≈ −4.7A, R_G = 24Ω, R_D = 5.6Ω See Fig. 16 (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	ALL	—	47	71	ns	
$t_{d(off)}$	Turn-Off Delay Time	ALL	—	13	20	ns	
t_f	Fall Time	ALL	—	39	59	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	ALL	—	7.2	11	nC	V_{GS} = −10V, I_D = −4.7A, V_{DS} = 0.8 Max. Rating. See Fig. 17 for test circuit. (Gate charge is essentially independent of operating temperature.)
Q_{gs}	Gate-Source Charge	ALL	—	2.5	3.8	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	ALL	—	2.7	4.1	nC	
L_D	Internal Drain Inductance	ALL	—	4.0	—	nH	Measured from the drain lead, 6mm (0.25 in.) from package to center of die. / Modified MOSFET symbol showing the internal device inductances.
L_S	Internal Source Inductance	ALL	—	6.0	—	nH	Measured from the source lead, 6mm (0.25 in.) from package to source bonding pad.



Thermal Resistance

R_{thJA}	Junction-to-Ambient	ALL	—	—	120	K/W ⑤	Typical socket mount

Source-Drain Diode Ratings and Characteristics

I_S	Continuous Source Current (Body Diode)	IRFD9010	—	—	-1.1	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier. 
		IRFD9012	—	—	-0.91	A	
I_{SM}	Pulse Source Current (Body Diode) ③	IRFD9010	—	—	-8.8	A	
		IRFD9012	—	—	-7.3	A	
V_{SD}	Diode Forward Voltage ②	ALL	—	—	-5.5	V	T_C = 25°C, I_S = -1.1A, V_{GS} = 0V
t_{rr}	Reverse Recovery Time	ALL	33	75	160	ns	T_J = 25°C, I_F = -4.7A, dI_F/dt = 100A/μs
Q_{RR}	Reverse Recovered Charge	ALL	0.090	0.22	0.52	μC	T_J = 25°C, I_F = -4.7A, dI_F/dt = 100A/μs
t_{on}	Forward Turn-on Time	ALL	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by $L_S + L_D$.				

① T_J = 25°C to 150°C

⑤ K/W = °C/W
W/K = W/°C

② Repetitive Rating: Pulse width limited by max. junction temperature. See Transient Thermal Impedance Curve (Fig. 5).

③ @ V_{dd} = -25V, T_j = 25°C
L = 100 μH, R_G = 25Ω

④ Pulse Test: Pulse width ≤ 300 μs
Duty Cycle ≤ 2%.

4-PIN DIP

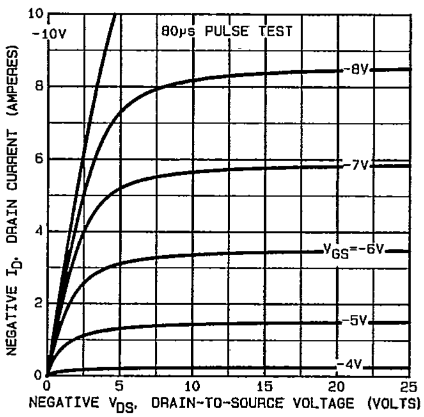


Fig. 1 — Typical Output Characteristics

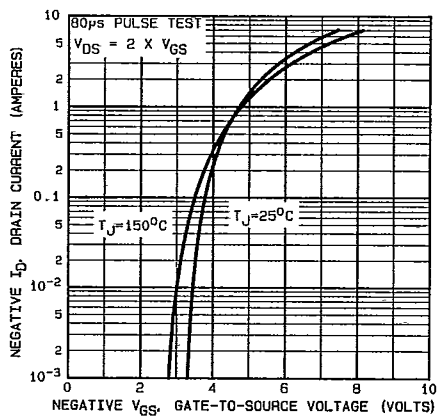


Fig. 2 — Typical Transfer Characteristics

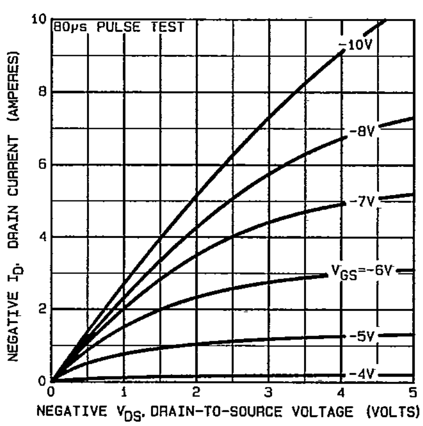


Fig. 3 — Typical Saturation Characteristics

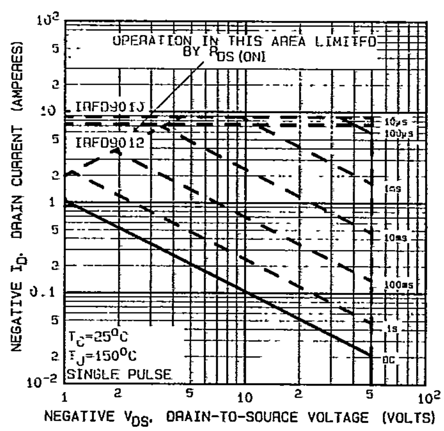


Fig. 4 — Maximum Safe Operating Area

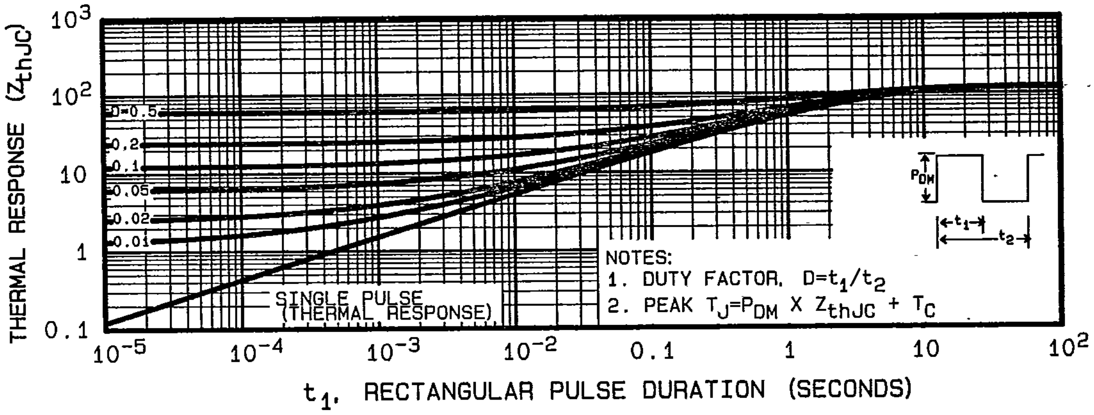


Fig. 5 — Maximum Effective Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration

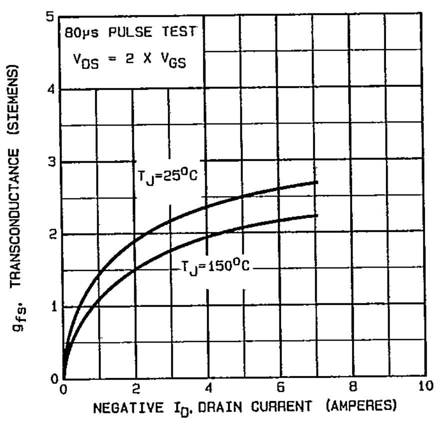


Fig. 6 — Typical Transconductance Vs. Drain Current

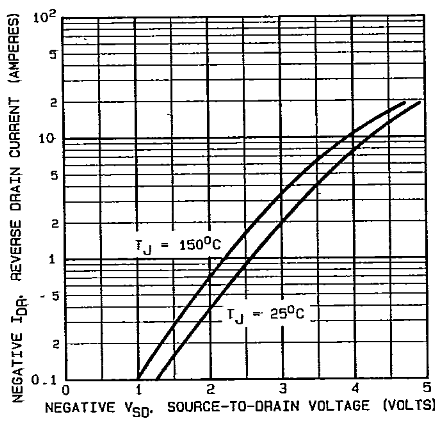


Fig. 7 — Typical Source-Drain Diode Forward Voltage

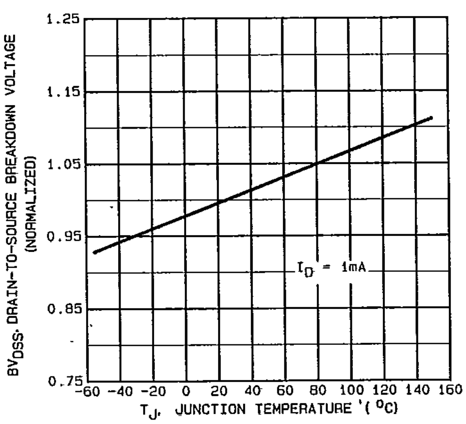


Fig. 8 — Breakdown Voltage Vs. Temperature

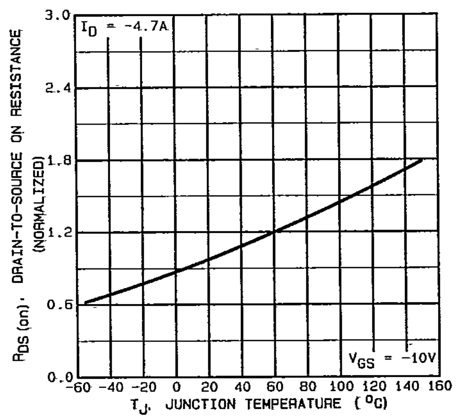


Fig. 9 — Normalized On-Resistance Vs. Temperature

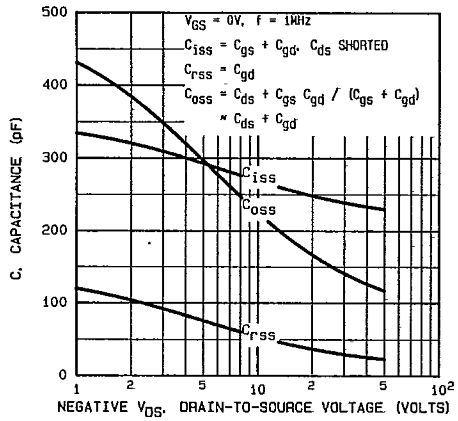


Fig. 10 — Typical Capacitance Vs. Drain-to-Source Voltage

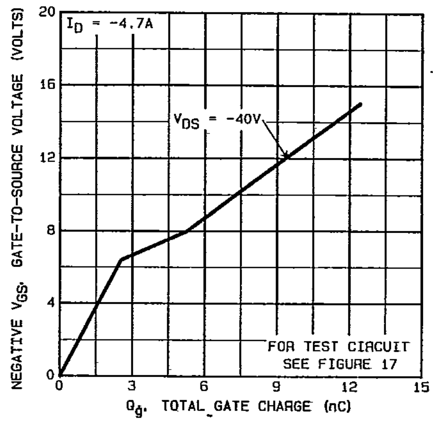


Fig. 11 — Typical Gate Charge Vs. Gate-to-Source Voltage

4-PIN DIP

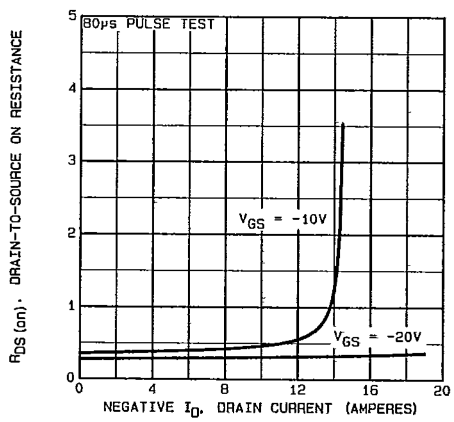


Fig. 12 — Typical On-Resistance Vs. Drain Current

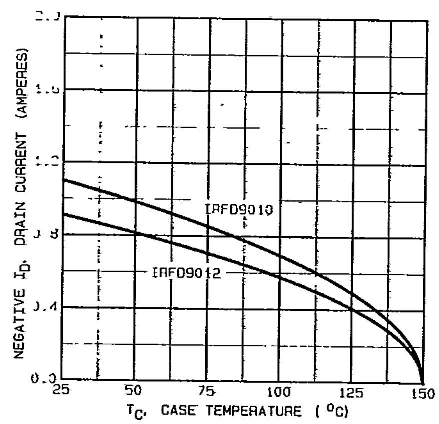


Fig. 13 — Maximum Drain Current Vs. Case Temperature

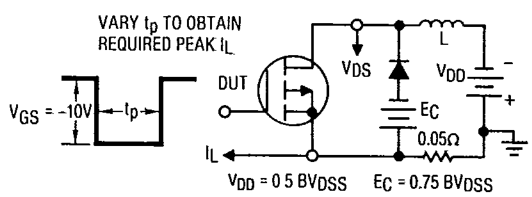


Fig. 14a — Clamped Inductive Test Circuit

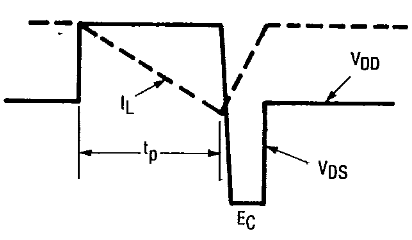


Fig. 14b — Clamped Inductive Waveforms

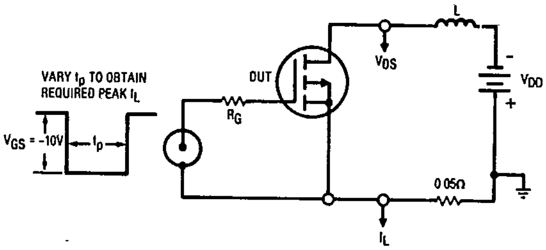


Fig. 15a — Unclamped Inductive Test Circuit

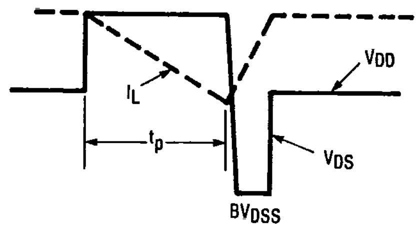


Fig. 15b — Unclamped Inductive Load Test Waveforms

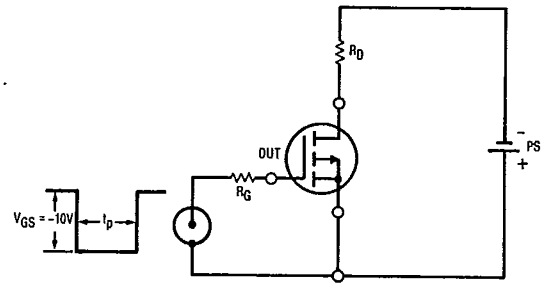


Fig. 16 — Switching Time Test Circuit

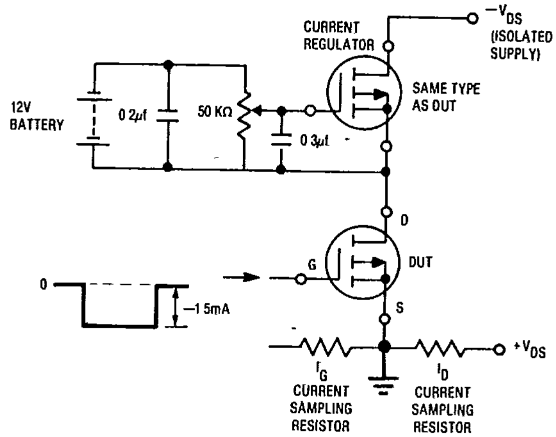


Fig. 17 — Gate Charge Test Circuit

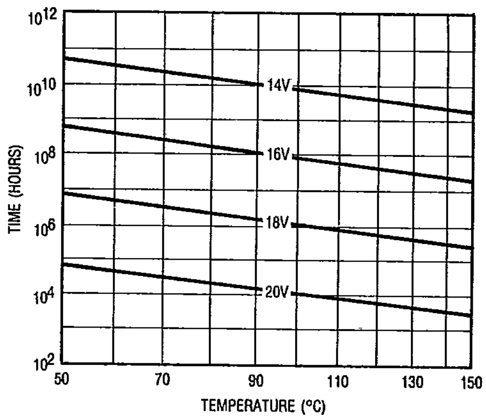


*Fig. 18 — Typical Time to Accumulated 1% Gate Failure

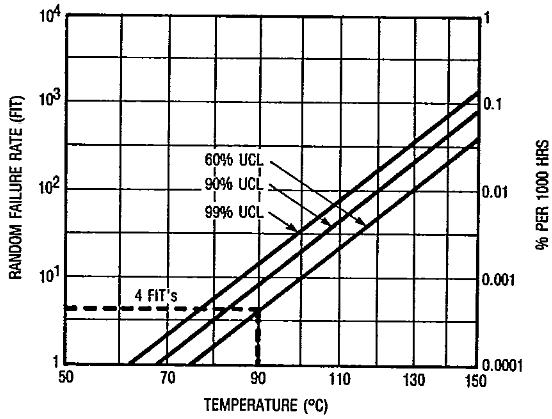


*Fig. 19 — Typical High Temperature Reverse Bias (HTRB) Failure Rate

*The data shown is correct as of April 15, 1987. This information is updated on a quarterly basis; for the latest reliability data, please contact your local IR field office.

Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

Как с нами связаться

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