

International **IR** Rectifier

Data Sheet No. PD60268 revA

IRS2001(S)PbF

HIGH AND LOW SIDE DRIVER Product Summary

Features

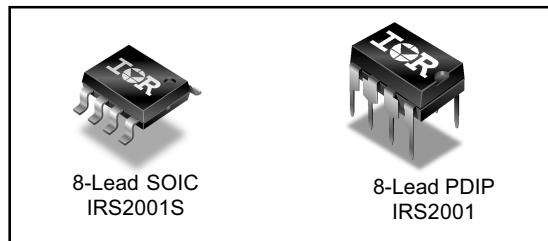
- Floating channel designed for bootstrap operation
- Fully operational to +200 V
- Tolerant to negative transient voltage, dV/dt immune
- Gate drive supply range from 10 V to 20 V
- Undervoltage lockout
- 3.3 V, 5 V, and 15 V logic input compatible
- Matched propagation delay for both channels
- Outputs in phase with inputs
- RoHS compliant

V _{OFFSET}	200 V max.
I _O +/-	200 mA/420 mA
V _{OUT}	10 V - 20 V
t _{on/off} (typ.)	160 ns/150 ns
Delay Matching	50 ns

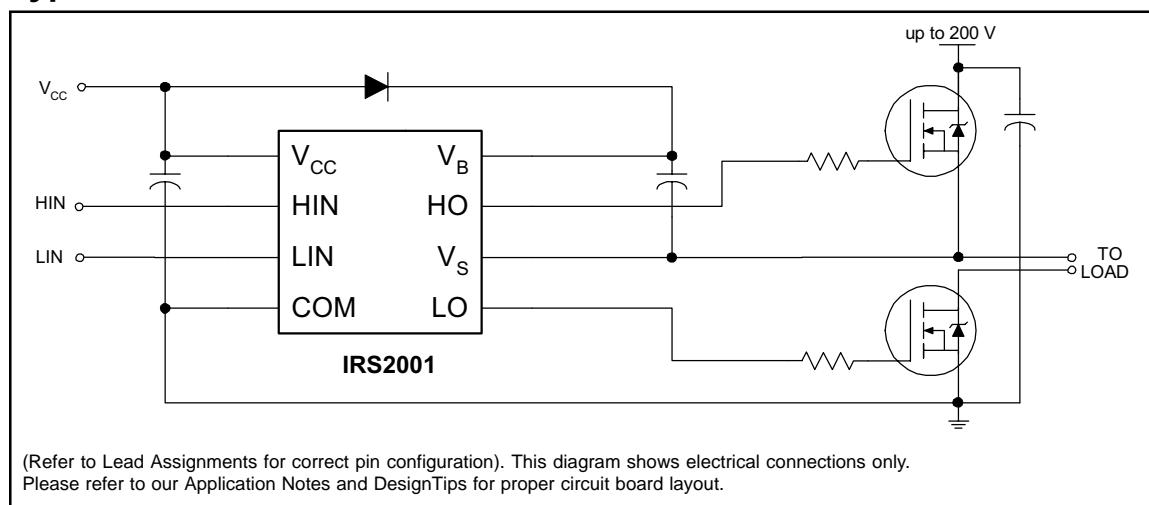
Description

The IRS2001 is a high voltage, high speed power MOSFET and IGBT driver with independent high-side and low-side referenced output channels. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL output, down to 3.3 V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high-side configuration which operates up to 200 V.

Packages



Typical Connection



Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

Symbol	Definition	Min.	Max.	Units
V_B	High-side floating supply voltage	-0.3	225	V
V_S	High-side floating supply offset voltage	$V_B - 25$	$V_B + 0.3$	
V_{HO}	High-side floating output voltage	$V_S - 0.3$	$V_B + 0.3$	
V_{CC}	Low-side and logic fixed supply voltage	-0.3	25	
V_{LO}	Low-side output voltage	-0.3	$V_{CC} + 0.3$	
V_{IN}	Logic input voltage (HIN & LIN)	-0.3	$V_{CC} + 0.3$	
dV_S/dt	Allowable offset supply voltage transient	—	50	V/ns
P_D	Package power dissipation @ $T_A \leq +25^\circ\text{C}$	(8 lead PDIP)	—	1.0
		(8 lead SOIC)	—	0.625
R_{thJA}	Thermal resistance, junction to ambient	(8 lead PDIP)	—	125
		(8 lead SOIC)	—	200
T_J	Junction temperature	—	150	$^\circ\text{C}$
T_S	Storage temperature	-55	150	
T_L	Lead temperature (soldering, 10 seconds)	—	300	

Recommended Operating Conditions

The input/output logic timing diagram is shown in Fig. 1. For proper operation the device should be used within the recommended conditions. The V_S offset rating is tested with all supplies biased at a 15 V differential.

Symbol	Definition	Min.	Max.	Units
V_B	High-side floating supply absolute voltage	$V_S + 10$	$V_S + 20$	V
V_S	High-side floating supply offset voltage	Note 1	200	
V_{HO}	High-side floating output voltage	V_S	V_B	
V_{CC}	Low-side and logic fixed supply voltage	10	20	
V_{LO}	Low-side output voltage	0	V_{CC}	
V_{IN}	Logic input voltage (HIN & LIN)	0	V_{CC}	
T_A	Ambient temperature	-40	125	$^\circ\text{C}$

Note 1: Logic operational for V_S of -5 V to +200 V. Logic state held for V_S of -5 V to $-V_{BS}$. (Please refer to the Design Tip DT97-3 for more details).

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Dynamic Electrical Characteristics

V_{BIAS} (V_{CC} , V_{BS}) = 15 V, C_L = 1000 pF and T_A = 25 °C unless otherwise specified.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-on propagation delay	—	160	220	ns	$V_S = 0$ V
t_{off}	Turn-off propagation delay	—	150	220		$V_S = 200$ V
t_r	Turn-on rise time	—	70	100		
t_f	Turn-off fall time	—	35	60		
MT	Delay matching, HS & LS turn-on/off	—	—	50		

Static Electrical Characteristics

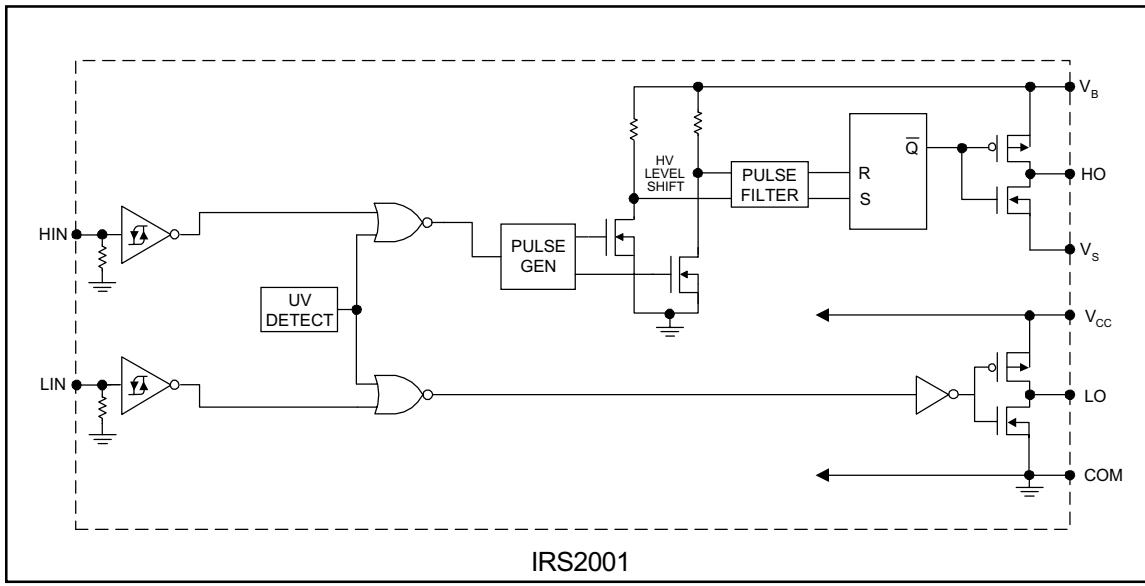
V_{BIAS} (V_{CC} , V_{BS}) = 15 V and T_A = 25 °C unless otherwise specified. The V_{IN} , V_{TH} , and I_{IN} parameters are referenced to COM. The V_O and I_O parameters are referenced to COM and are applicable to the respective output leads: HO or LO.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
V_{IH}	Logic "1" input voltage	2.5	—	—	V	$V_{CC} = 10$ V to 20 V
V_{IL}	Logic "0" input voltage	—	—	0.8		
V_{OH}	High level output voltage, $V_{BIAS} - V_O$	—	0.05	0.1		$I_O = 2$ mA
V_{OL}	Low level output voltage, V_O	—	0.02	0.05		
I_{LK}	Offset supply leakage current	—	—	50	μ A	$V_B = V_S = 200$ V
I_{QBS}	Quiescent V_{BS} supply current	—	30	55		$V_{IN} = 0$ V or 5 V
I_{QCC}	Quiescent V_{CC} supply current	—	150	270		
I_{IN+}	Logic "1" input bias current	—	3	10		$V_{IN} = 5$ V
I_{IN-}	Logic "0" input bias current	—	—	5		$V_{IN} = 0$ V
V_{CCUV+}	V_{CC} supply undervoltage positive going threshold	8	8.9	9.8	V	
V_{CCUV-}	V_{CC} supply undervoltage negative going threshold	7.4	8.2	9		
I_{O+}	Output high short circuit pulsed current	200	290	—	mA	$V_O = 0$ V $V_{IN} = \text{Logic "1"}$ $PW \leq 10 \mu\text{s}$
I_{O-}	Output low short circuit pulsed current	420	600	—		$V_O = 15$ V $V_{IN} = \text{Logic "0"}$ $PW \leq 10 \mu\text{s}$

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Functional Block Diagram



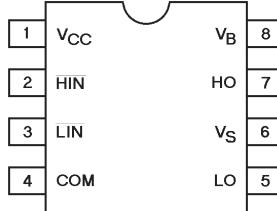
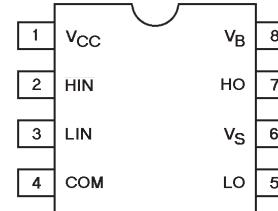
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Lead Definitions

Symbol	Description
HIN	Logic input for high-side gate driver output (HO), in phase
LIN	Logic input for low-side gate driver output (LO), in phase
V _B	High-side floating supply
HO	High-side gate drive output
V _S	High-side floating supply return
V _{CC}	Low-side and logic fixed supply
LO	Low-side gate drive output
COM	Low-side return

Lead Assignments

 8 Lead PDIP	 8 Lead SOIC
IRS2001PbF	IRS2001SPbF
Part Number	

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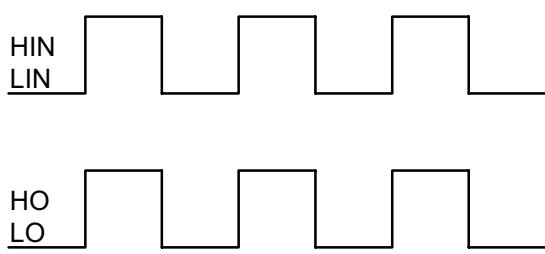


Figure 1. Input/Output Timing Diagram

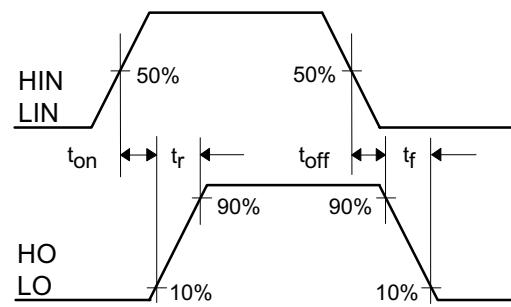


Figure 2. Switching Time Waveform Definitions

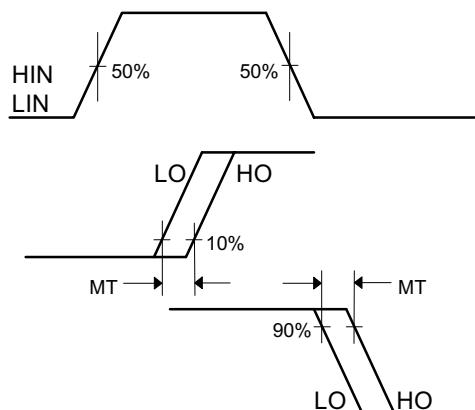


Figure 3. Delay Matching Waveform Definitions

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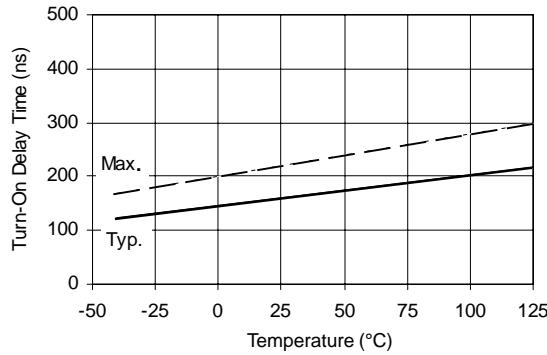


Figure 6A. Turn-On Time vs. Temperature

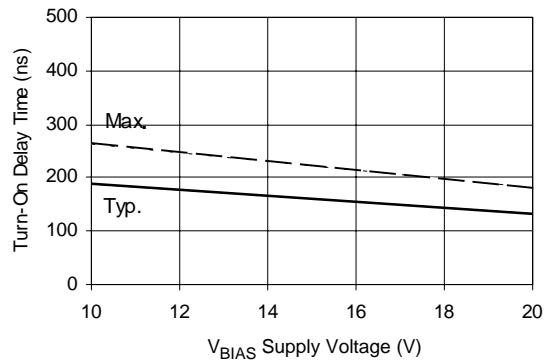


Figure 6B. Turn-On Time vs. Supply Voltage

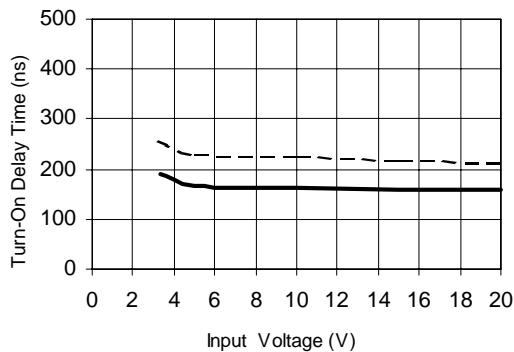


Figure 6C. Turn-On Time vs. Input Voltage

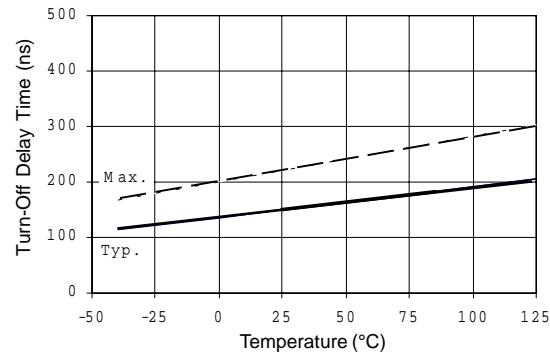


Figure 7A. Turn-Off Time vs. Temperature

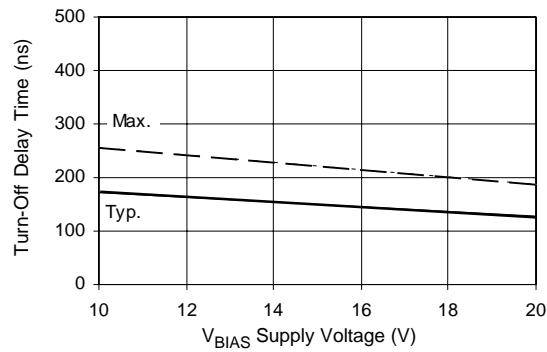


Figure 7B. Turn-Off Time vs. Supply Voltage

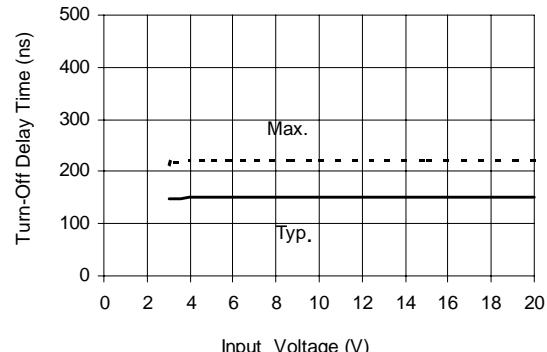


Figure 7C. Turn-Off Time vs. Input Voltage

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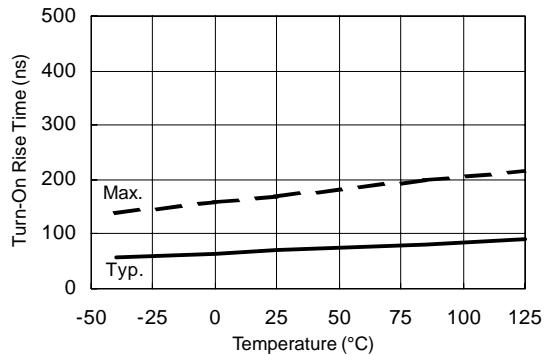


Figure 9A. Turn-On Rise Time vs. Temperature

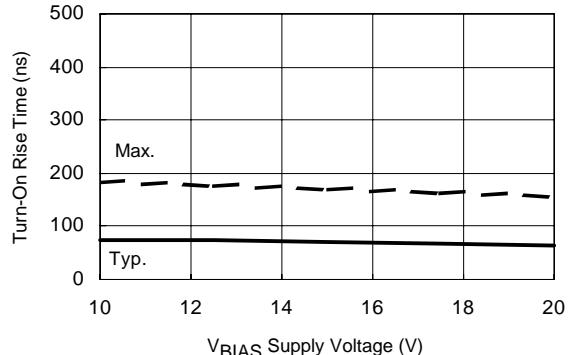


Figure 9B. Turn-On Rise Time vs. Voltage

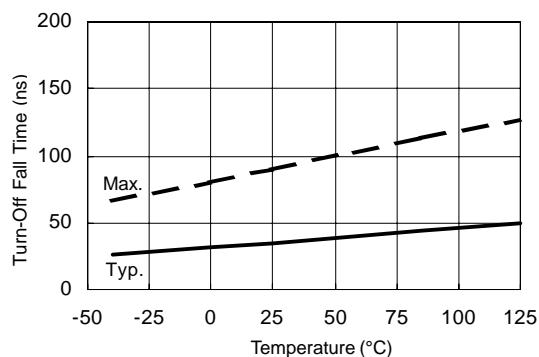


Figure 10A. Turn-Off Fall Time vs. Temperature

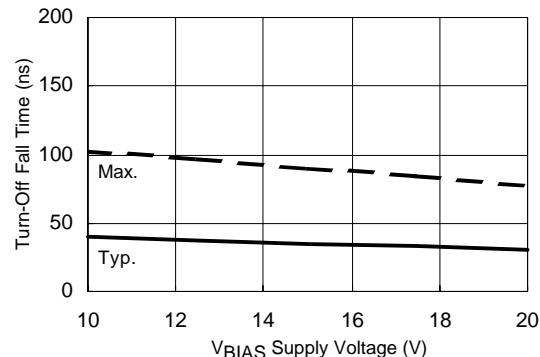


Figure 10B. Turn-Off Fall Time vs. Voltage

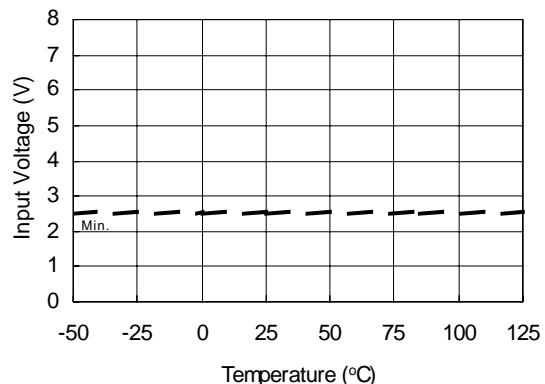


Figure 12A. Logic "1" Input Voltage vs. Temperature

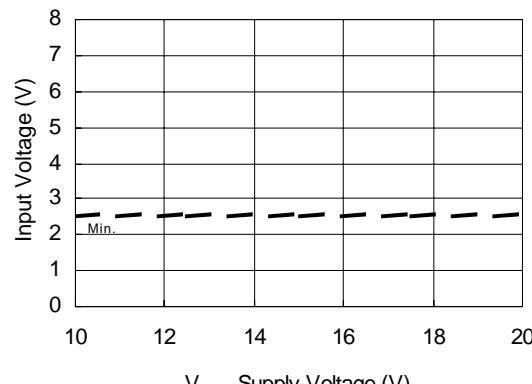


Figure 12B. Logic "1" Input Voltage vs. Voltage

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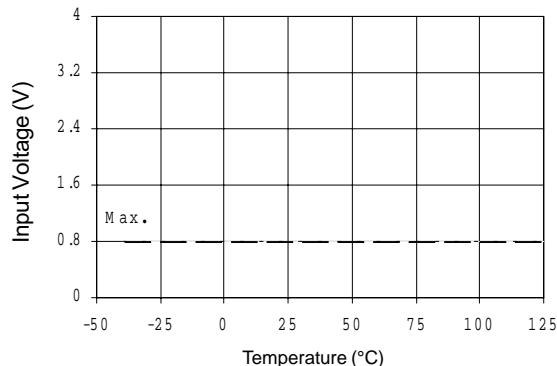


Figure 13A. Logic "0" Input Voltage vs. Temperature

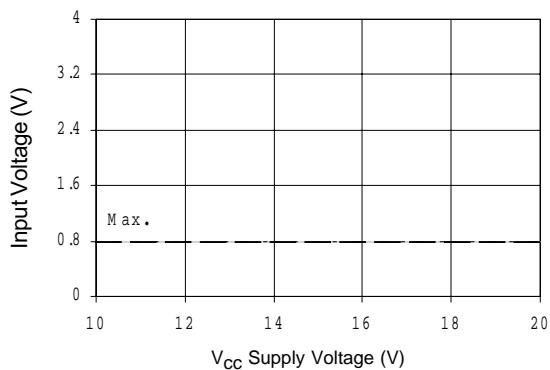


Figure 13B. Logic "0" Input Voltage vs. Supply Voltage

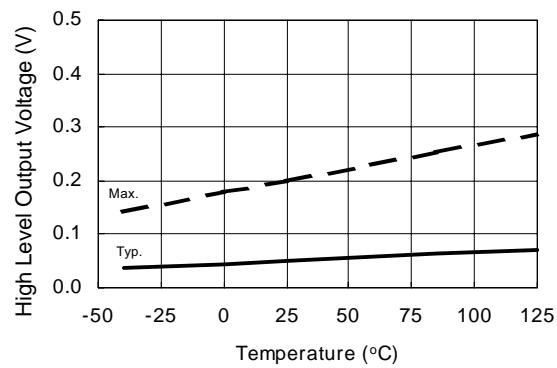


Figure 14A. High Level Output Voltage vs. Temperature

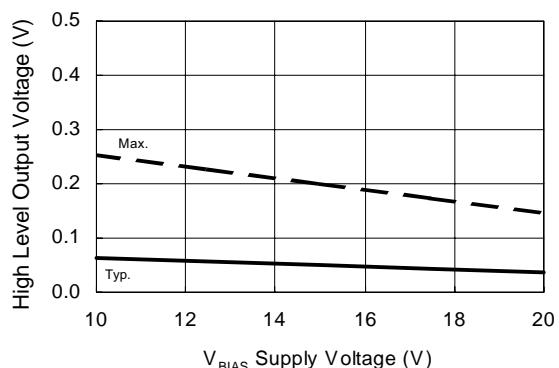


Figure 14B. High Level Output vs. Supply Voltage

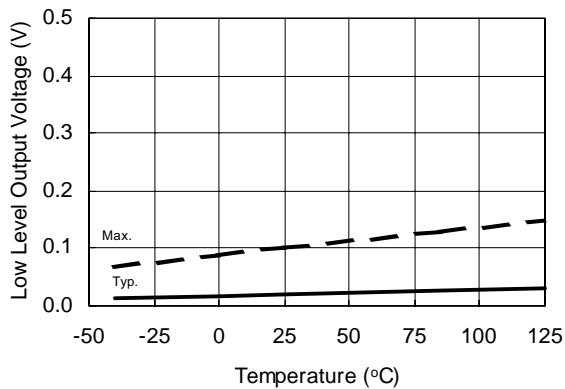


Figure 15A. Low Level Output Voltage vs. Temperature

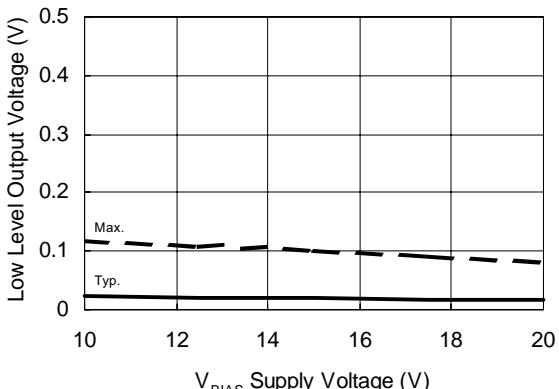


Figure 15B. Low level Output vs. Supply Voltage

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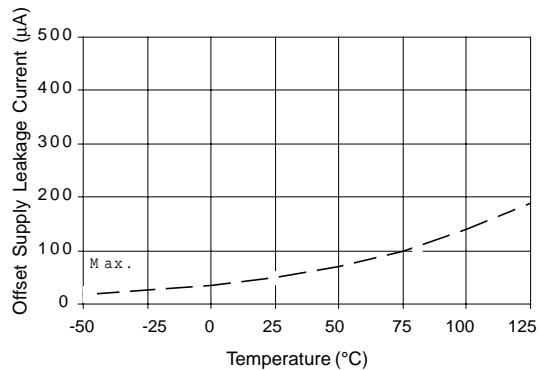


Figure 16A. Offset Supply Current vs. Temperature

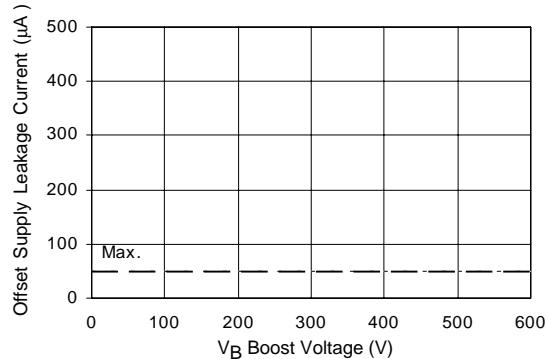


Figure 16B. Offset Supply Current vs. Voltage

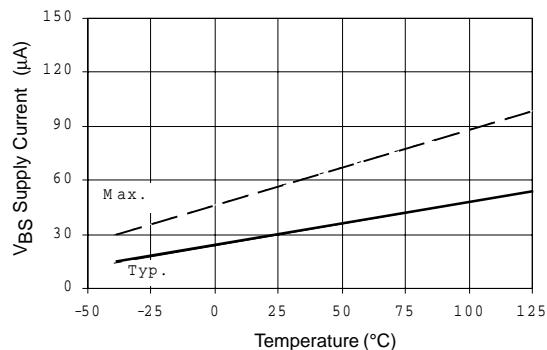


Figure 17A. V_{BS} Supply Current vs. Temperature

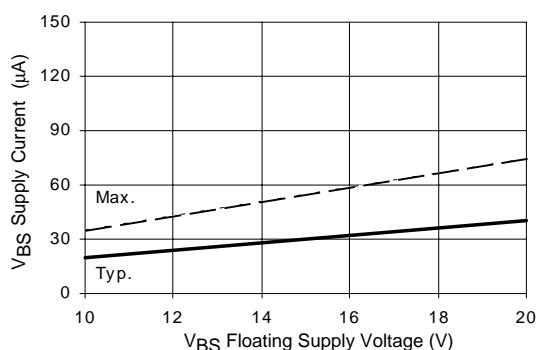


Figure 17B. V_{BS} Supply Current vs. Voltage

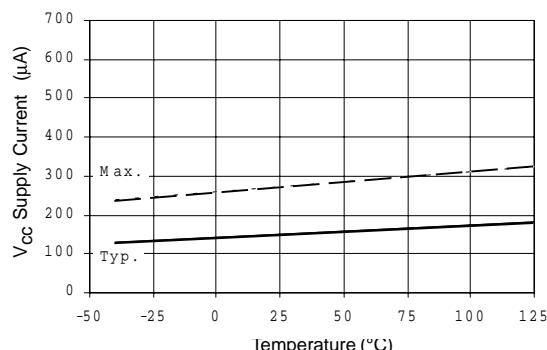


Figure 18A. V_{CC} Supply Current vs. Temperature

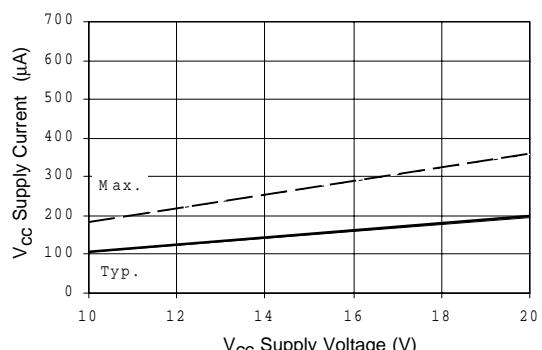


Figure 18B. V_{CC} Supply Current vs. Voltage

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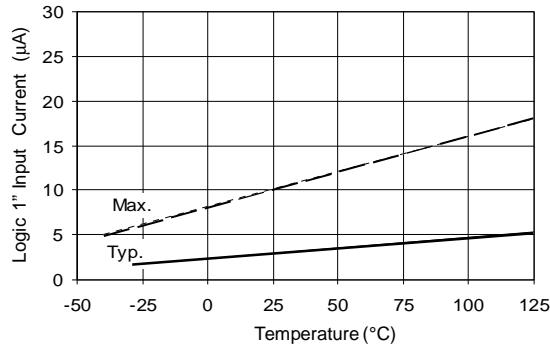


Figure 19A. Logic "1" Input Current vs. Temperature

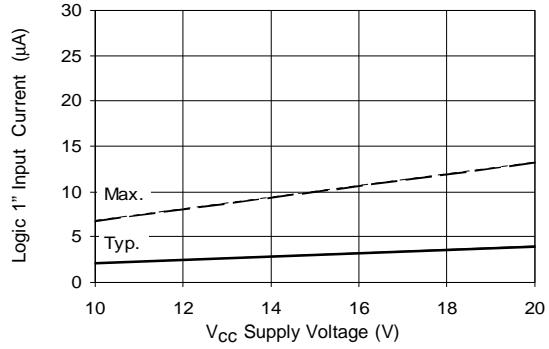


Figure 19B. Logic "1" Input Current vs. Voltage

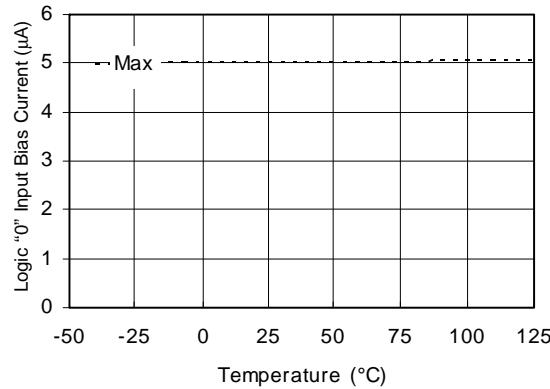


Figure 20A. Logic "0" Input Bias Current vs. Temperature

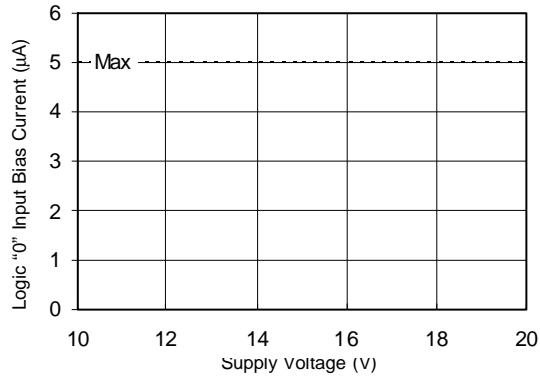


Figure 20B. Logic "0" Input Bias Current vs. Voltage

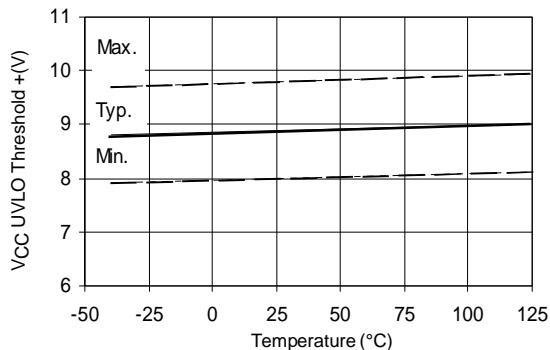


Figure 21A. V_{CC} Undervoltage Threshold(+) vs. Temperature

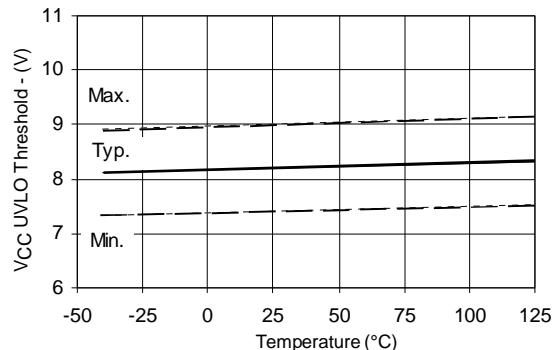


Figure 21B. V_{CC} Undervoltage Threshold(-) vs. Temperature

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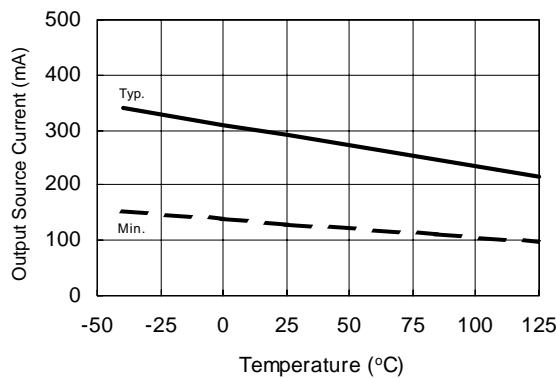


Figure 22A. Output Source Current vs. Temperature

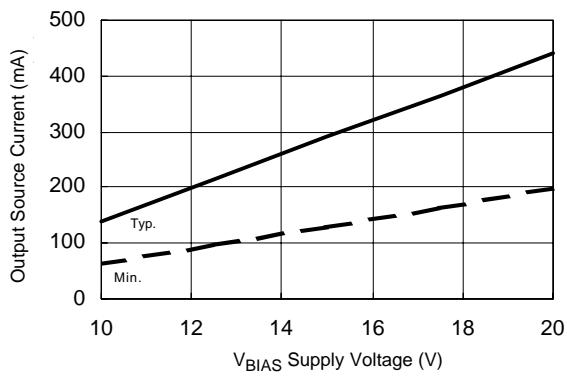


Figure 22B. Output Source Current vs. Supply Voltage

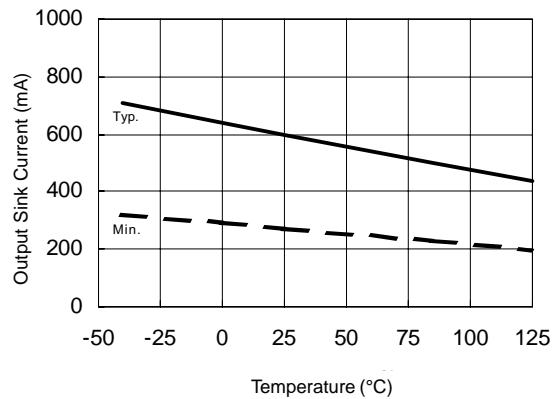


Figure 23A. Output Sink Current vs. Temperature

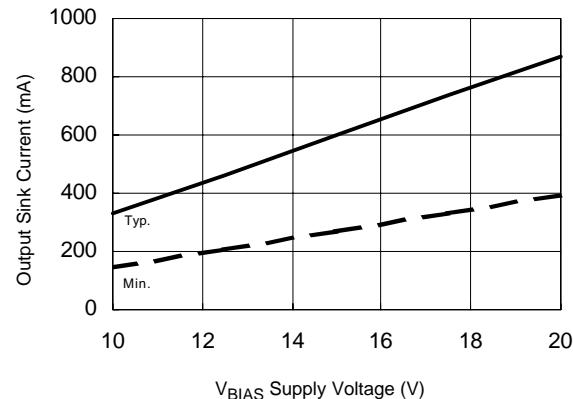
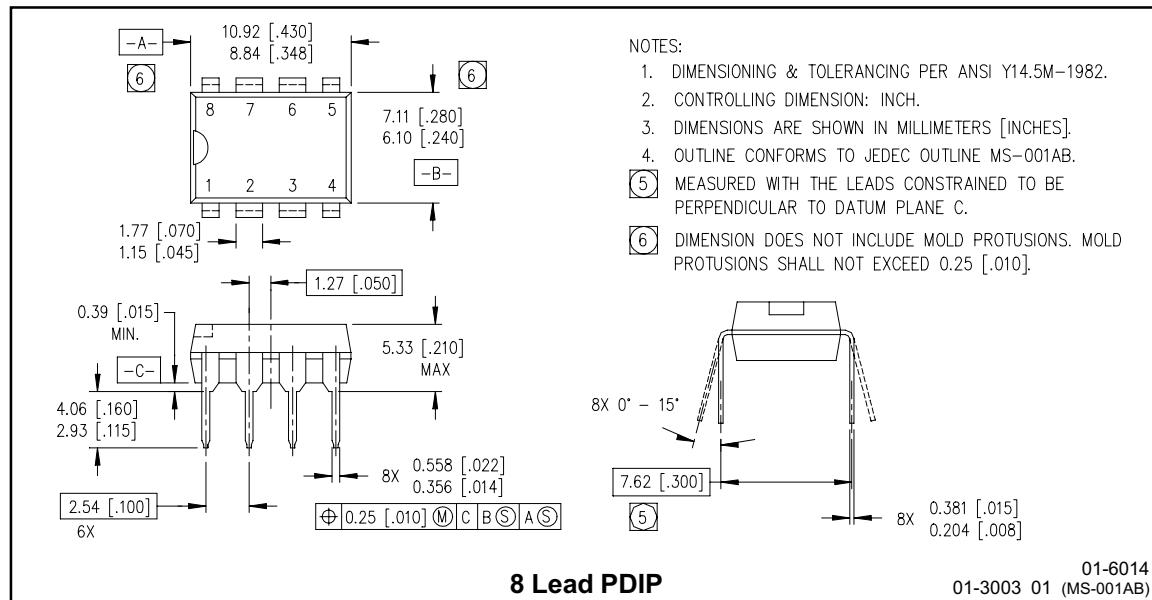


Figure 23B. Output Sink Current vs. Supply Voltage

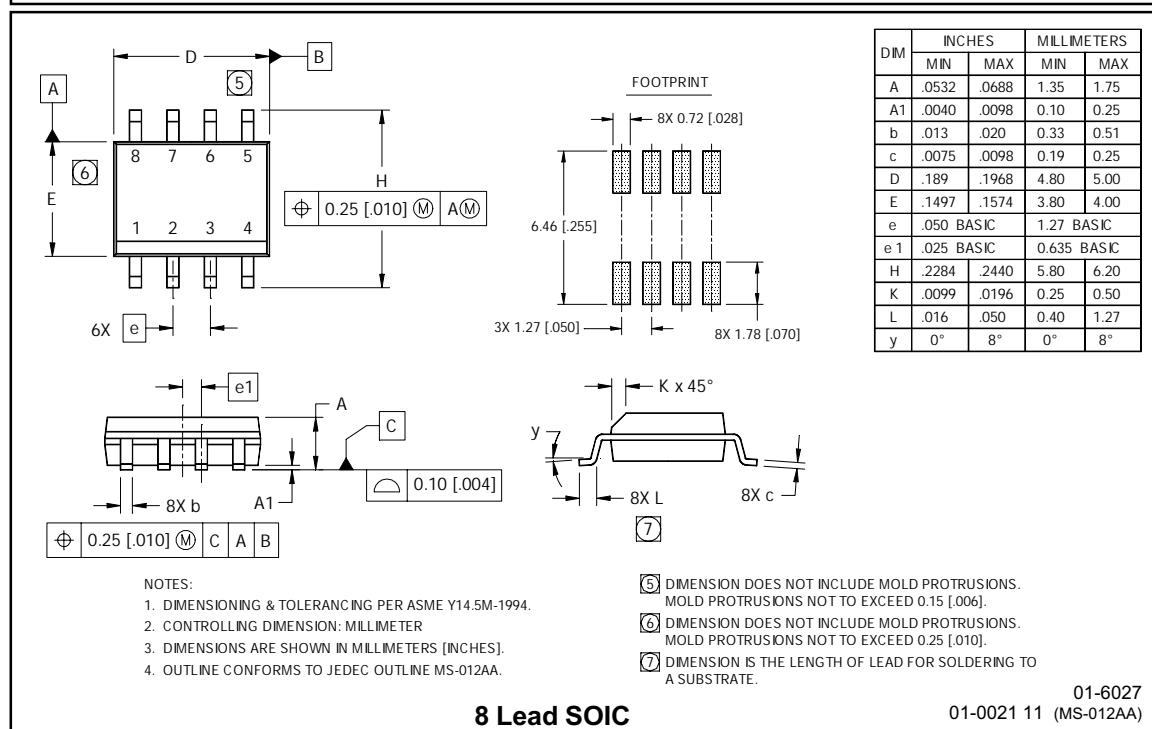
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Case Outlines



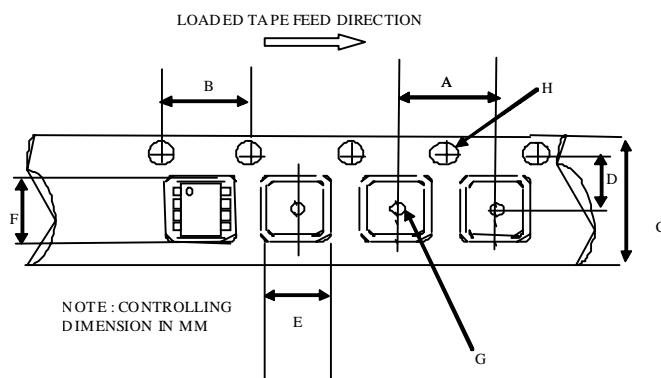
8 Lead PDIP



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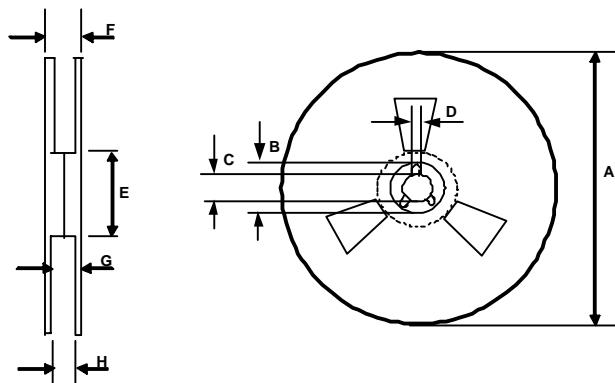
IRS2001(S)PbF

Tape & Reel 8-lead SOIC



CARRIER TAPE DIMENSION FOR 8SOICN

Code	Metric		Imperial	
	Min	Max	Min	Max
A	7.90	8.10	0.311	0.318
B	3.90	4.10	0.153	0.161
C	11.70	12.30	0.46	0.484
D	5.45	5.55	0.214	0.218
E	6.30	6.50	0.248	0.255
F	5.10	5.30	0.200	0.208
G	1.50	n/a	0.059	n/a
H	1.50	1.60	0.059	0.062



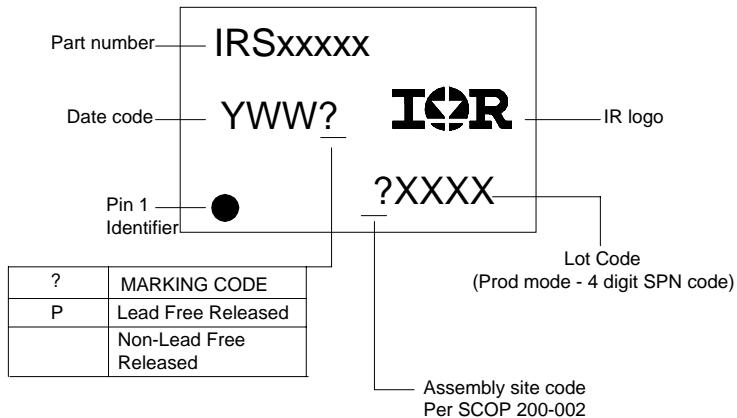
REEL DIMENSIONS FOR 8SOICN

Code	Metric		Imperial	
	Min	Max	Min	Max
A	329.60	330.25	12.976	13.001
B	20.95	21.45	0.824	0.844
C	12.80	13.20	0.503	0.519
D	1.95	2.45	0.767	0.096
E	98.00	102.00	3.858	4.015
F	n/a	18.40	n/a	0.724
G	14.50	17.10	0.570	0.673
H	12.40	14.40	0.488	0.566

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LEADFREE PART MARKING INFORMATION



ORDER INFORMATION

8-Lead PDIP IRS2001PbF
8-Lead SOIC IRS2001SPbF
8-Lead SOIC Tape & Reel IRS2001STRPbF

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The SOIC-8 is MSL2 qualified.

This product has been designed and qualified for the industrial level.

Qualification standards can be found at www.irf.com

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 Tel: (310) 252-7105
Data and specifications subject to change without notice. 8/18/2008



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, помошь 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 помошь 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

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.