International
IOR Rectifier

Data Sheet No. PD60018-M

IR2121 & (PbF)

CURRENT LIMITING LOW SIDE DRIVER

Features

- Gate drive supply range from 12 to 18V
- Undervoltage lockout
- Current detection and limiting loop to limit driven power transistor current
- Error lead indicates fault conditions and programs shutdown time
- Output in phase with input
- 2.5V, 5V and 15V input logic compatible
- Also available LEAD-FREE

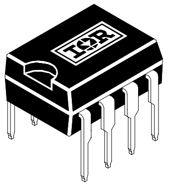
Description

The IR2121 is a high speed power MOSFET and IGBT driver with over-current limiting protection circuitry. Latch immune CMOS technology enables ruggedized monolithic construction. Logic inputs are compatible with standard CMOS or LSTTL outputs, down to 2.5V logic. The output driver features a high pulse current buffer stage designed for minimum cross-conduction. The protection circuitry detects over-current in the driven power transistor and limits the gate drive voltage. Cycle-by-cycle shutdown is programmed by an external capacitor which directly controls the time interval between detection of the over-current limiting condition and latched shutdown. The output can be used to drive an N-channel power MOSFET or IGBT in the low side configuration.

Product Summary

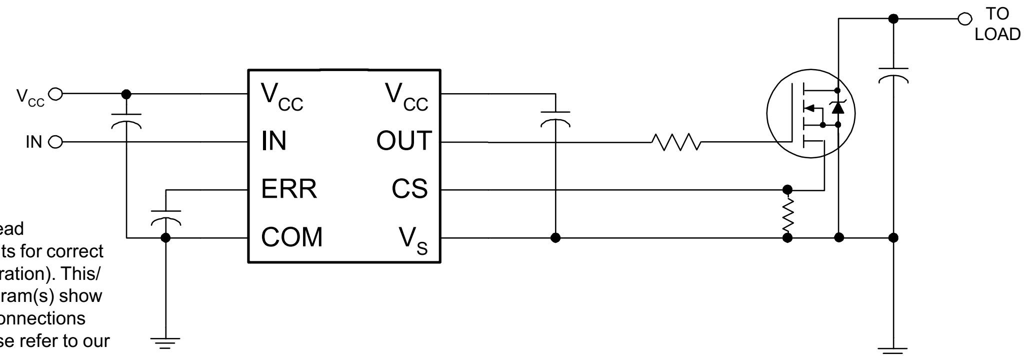
V_{OFFSET}	5V max.
I_O+/-	1A / 2A
V_{OUT}	12 - 18V
V_{CSth}	230 mV
$t_{on/off}$ (typ.)	150 & 150 ns

Package



8-Lead PDIP

Typical Connection



(Refer to Lead Assignments for correct pin configuration). This/These diagram(s) show electrical connections only. Please refer to our Application Notes and DesignTips for proper circuit board layout.

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.

Parameter		Value		
Symbol	Definition	Min.	Max.	Units
V_{CC}	Fixed Supply Voltage	-0.3	25	V
V_S	Gate Drive Return Voltage	V_{CC} - 25	V_{CC} + 0.3	
V_O	Output Voltage	V_S - 0.3	V_{CC} + 0.3	
V_{IN}	Logic Input Voltage	-0.3	V_{CC} + 0.3	
V_{ERR}	Error Signal Voltage	-0.3	V_{CC} + 0.3	
V_{CS}	Current Sense Voltage	V_S - 0.3	V_{CC} + 0.3	
P_D	Package Power Dissipation @ $T_A \leq$ +25°C	—	1.0	W
Rth_{JA}	Thermal Resistance, Junction to Ambient	—	125	°C/W
T_J	Junction Temperature	—	150	°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 Figure 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 15V differential.

Parameter		Value		
Symbol	Definition	Min.	Max.	Units
V_{CC}	Fixed Supply Voltage	V_S + 12	V_S + 18	V
V_S	Gate Drive Return Voltage	-5	5	
V_O	Output Voltage	V_S	V_{CC}	
V_{IN}	Logic Input Voltage	0	V_{CC}	
V_{ERR}	Error Signal Voltage	0	V_{CC}	
V_{CS}	Current Sense Signal Voltage	V_S	V_{CC}	
T_A	Ambient Temperature	-40	125	°C

Dynamic Electrical Characteristics

V_{BIAS} (V_{CC}) = 15V, C_L = 3300 pF and T_A = 25°C unless otherwise specified. The dynamic electrical characteristics are defined in Figures 2 through 5.

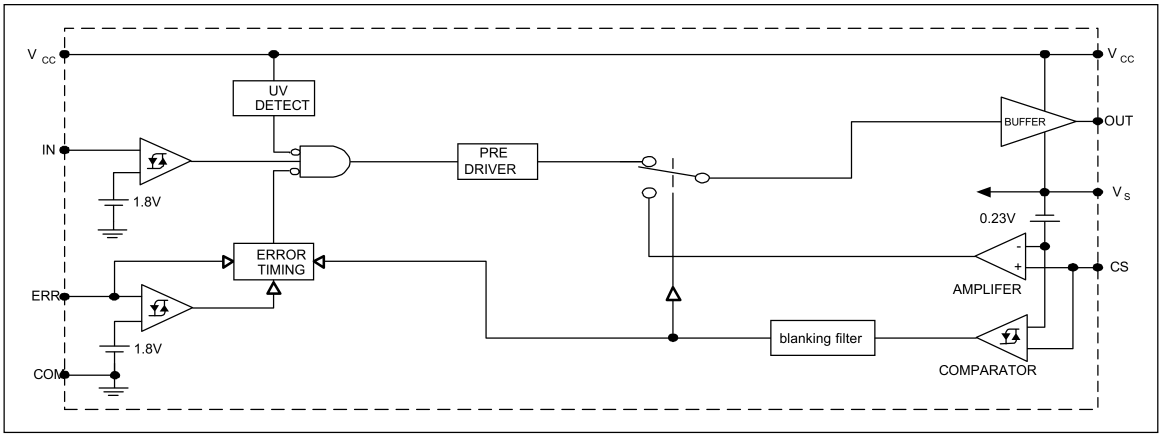
Parameter			Value				
Symbol	Definition	Figure	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-On Propagation Delay	7	—	150	200	ns	V_{IN} = 0 & 5V
t_{off}	Turn-Off Propagation Delay	8	—	200	250		
t_{sd}	ERR Shutdown Propagation Delay	9	—	1.7	2.2	µs	
t_r	Turn-On Rise Time	10	—	43	60	ns	
t_f	Turn-Off Fall Time	11	—	26	35		
t_{cs}	CS Shutdown Propagation Delay	12	—	0.7	1.2	µs	
t_{err}	CS to ERR Pull-Up Propagation Delay	13	—	9.0	12		C_{ERR} = 270 pF

Static Electrical Characteristics

V_{BIAS} (V_{CC}) = 15V 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 V_S .

Parameter			Value				
Symbol	Definition	Figure	Min.	Typ.	Max.	Units	Test Conditions
V_{IH}	Logic "1" Input Voltage	14	2.2	—	—	V	
V_{IL}	Logic "0" Input Voltage	15	—	—	0.8		
V_{CSTH+}	CS Input Positive Going Threshold	16	150	230	320	mV	
V_{CSTH-}	CS Input Negative Going Threshold	17	130	210	300		
V_{OH}	High Level Output Voltage, V_{BIAS} - V_O	18	—	—	100		I_O = 0A
V_{OL}	Low Level Output Voltage, V_O	19	—	—	100		I_O = 0A
I_{QCC}	Quiescent VCC Supply Current	20	—	1.1	2.2	mA	V_{IN} = V_{CS} = 0V or 5V
I_{IN+}	Logic "1" Input Bias Current	21	—	4.5	10	µA	V_{IN} = 5V
I_{IN-}	Logic "0" Input Bias Current	22	—	—	1.0		V_{IN} = 0V
I_{CS+}	"High" CS Bias Current	23	—	4.5	10		V_{CS} = 3V or 5V
I_{CS-}	"Low" CS Bias Current	24	—	—	1.0		V_{CS} = 0V
V_{CCUV+}	V_{CC} Supply Undervoltage Positive Going Threshold	25	8.3	8.9	9.6	V	
V_{CCUV-}	V_{CC} Supply Undervoltage Negative Going Threshold	26	7.3	8.0	8.7		
I_{ERR}	ERR Timing Charge Current	27	65	100	130	µA	V_{IN} = 5V, V_{CS} = 3V ERR < V_{ERR+}
I_{ERR+}	ERR Pull-Up Current	28	8.0	15	—	mA	V_{IN} = 5V, V_{CS} = 3V ERR > V_{ERR+}
I_{ERR-}	ERR Pull-Down Current	29	16	30	—		V_{IN} = 0V
I_{O+}	Output High Short Circuit Pulsed Current	30	1.0	1.6	—	A	V_O = 0V, V_{IN} = 5V PW ≤ 10 µs
I_{O-}	Output Low Short Circuit Pulsed Current	31	2.0	3.3	—		V_O = 15V, V_{IN} = 0V PW ≤ 10 µs

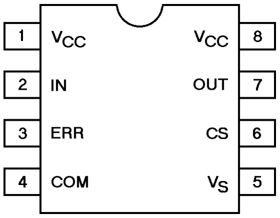
Functional Block Diagram



Lead Definitions

Lead Symbol	Description
V_{CC}	Logic and gate drive supply
IN	Logic input for gate driver output (OUT), in phase with OUT
ERR	Serves multiple functions; status reporting, linear mode timing and cycle by cycle logic shutdown
COM	Logic ground
OUT	Gate drive output
V_S	Gate drive supply return
CS	Current sense input to current sense comparator

Lead Assignments



8 Lead PDIP

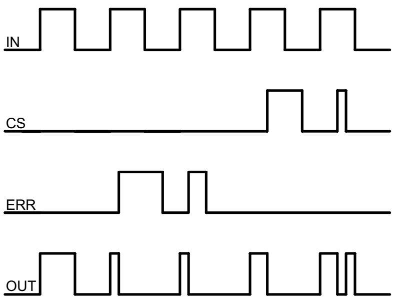


Figure 1. Input/Output Timing Diagram

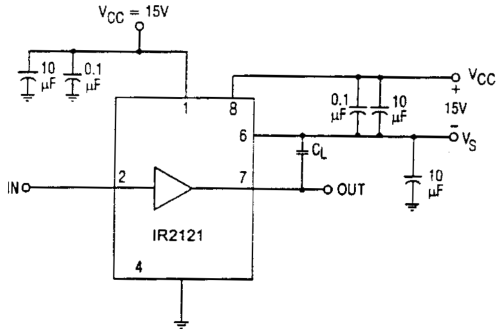


Figure 2. Switching Time Test Circuit

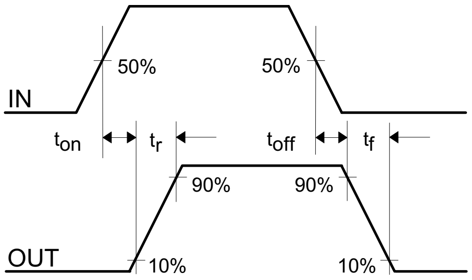


Figure 3. Switching Time Waveform Definitions

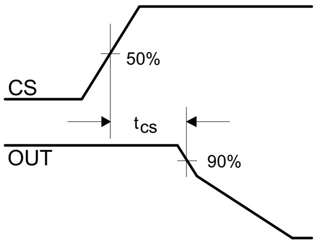


Figure 4. ERR Shutdown Waveform Definitions

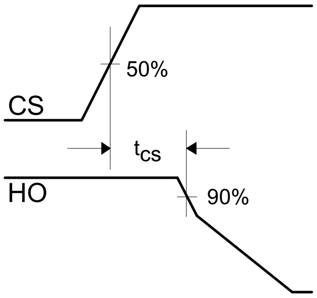
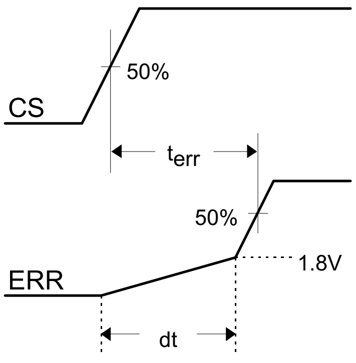


Figure 5. CS Shutdown Waveform Definitions



$$dt = C \times \frac{dV}{I_{ERR}} = C \times \frac{1.8V}{100\ uA}$$

Figure 6. CS to ERR Waveform Definitions

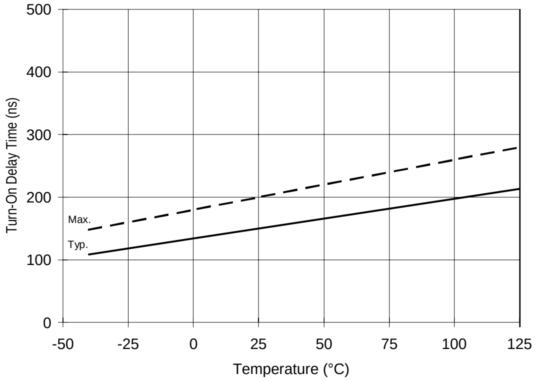


Figure 7A. Turn-On Time vs. Temperature

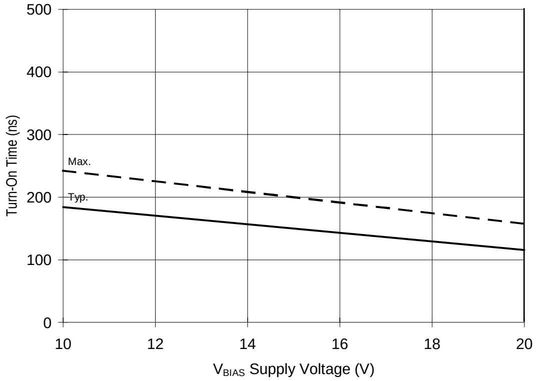


Figure 7B. Turn-On Time vs. Voltage

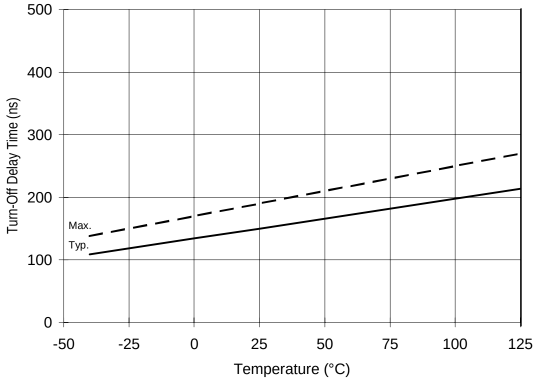


Figure 8A. Turn-Off Time vs. Temperature

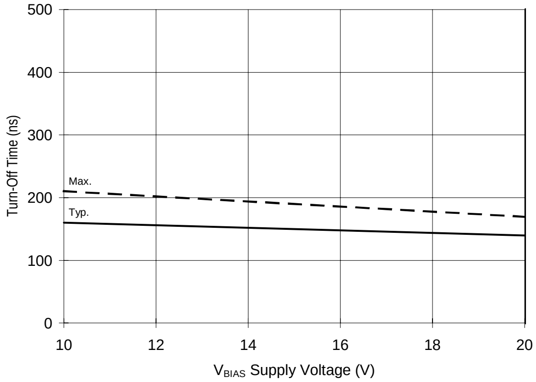


Figure 8B. Turn-Off Time vs. Voltage

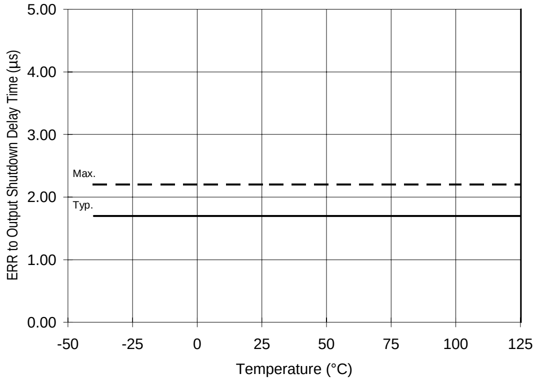


Figure 9A. ERR to Output Shutdown vs. Temperature

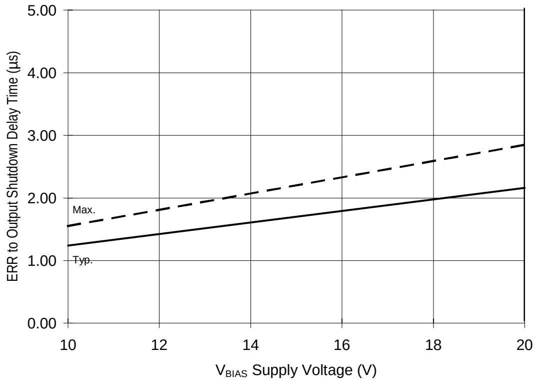


Figure 9B. ERR to Output Shutdown vs. Voltage

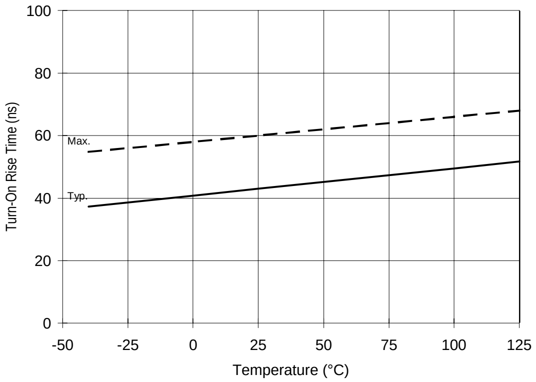


Figure 10A. Turn-On Rise Time vs. Temperature

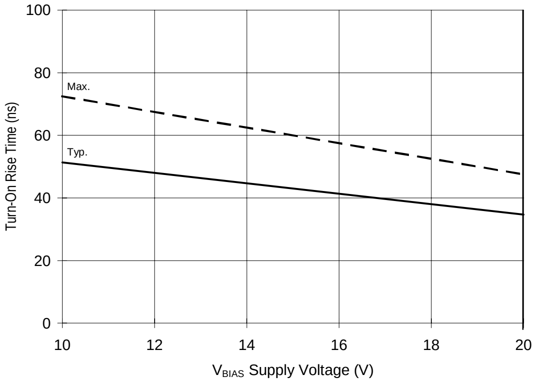


Figure 10B. Turn-On Rise Time vs. Voltage

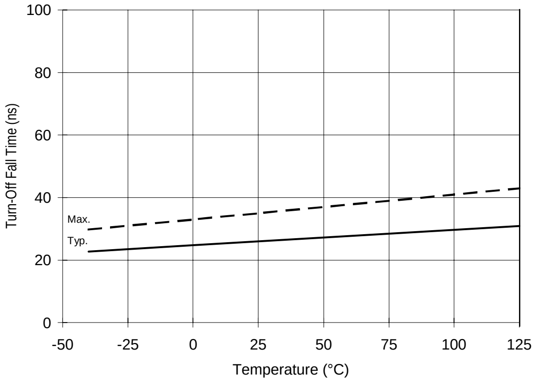


Figure 11A. Turn-Off Fall Time vs. Temperature

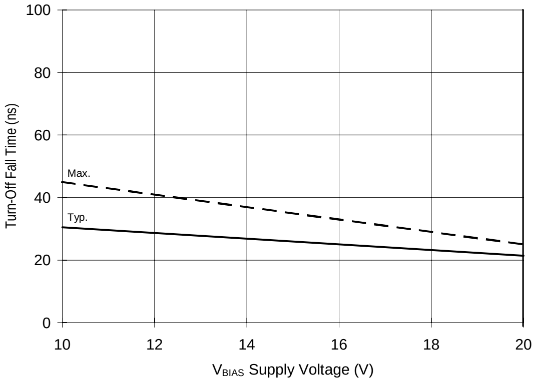


Figure 11B. Turn-Off Fall Time vs. Voltage

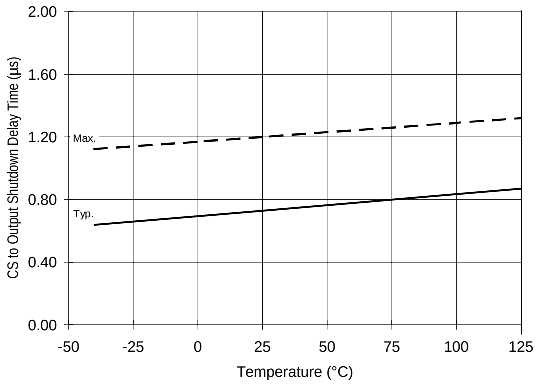


Figure 12A. CS to Output Shutdown vs. Temperature

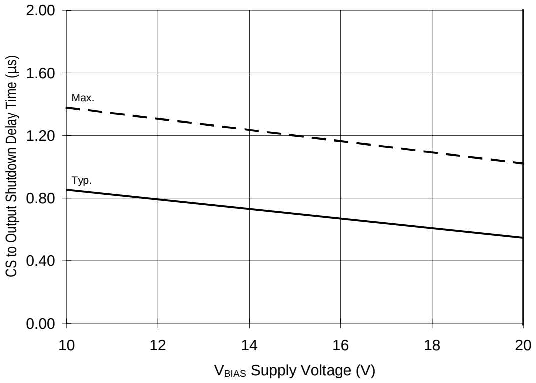


Figure 12B. CS to Output Shutdown vs. Voltage

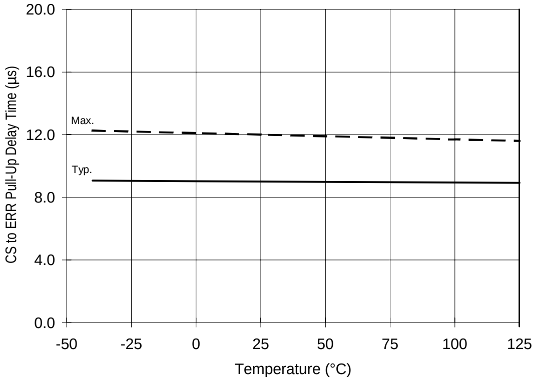


Figure 13A. CS to ERR Pull-Up vs. Temperature

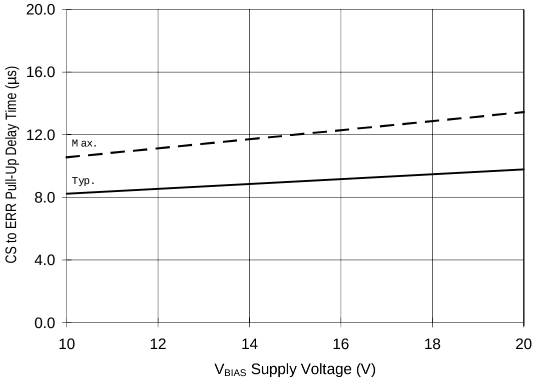


Figure 13B. CS to ERR Pull-Up vs. Voltage

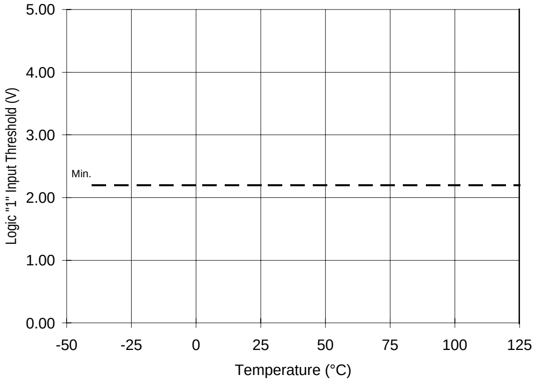


Figure 14A. Logic "1" Input Threshold vs. Temperature

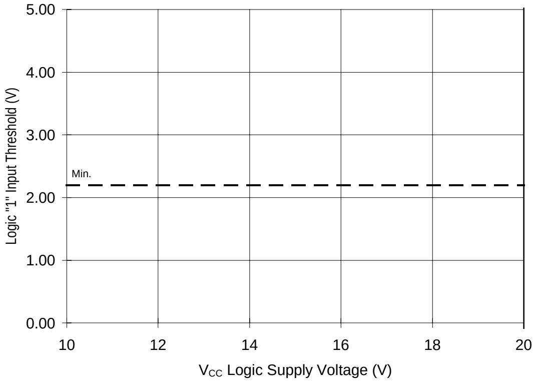


Figure 14B. Logic "1" Input Threshold vs. Voltage

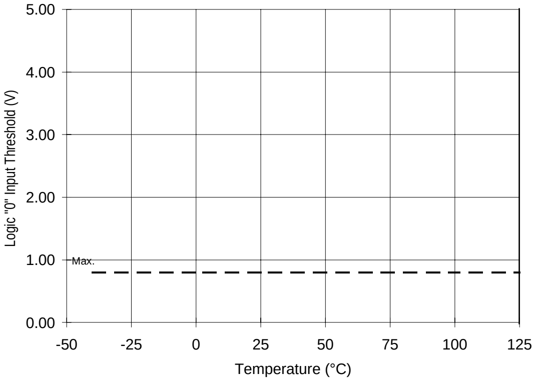


Figure 15A. Logic "0" Input Threshold vs. Temperature

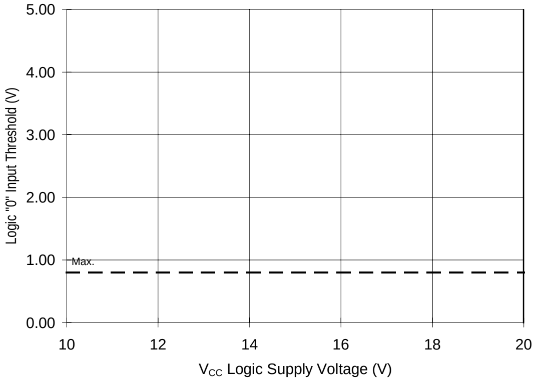


Figure 15B. Logic "0" Input Threshold vs. Voltage

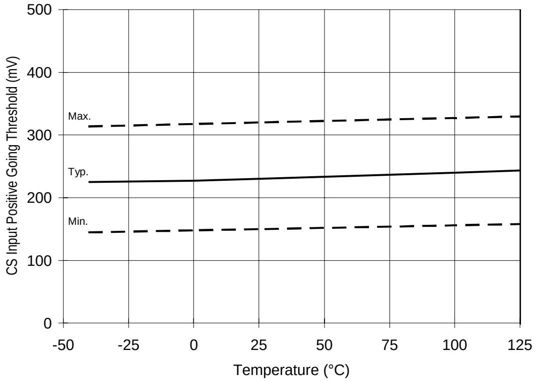


Figure 16A. CS Input Threshold (+) vs. Temperature

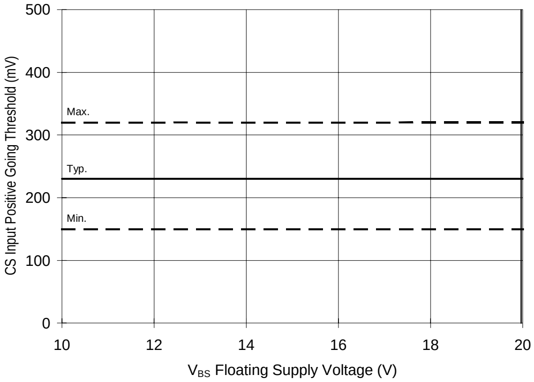


Figure 16B. CS Input Threshold (+) vs. Voltage

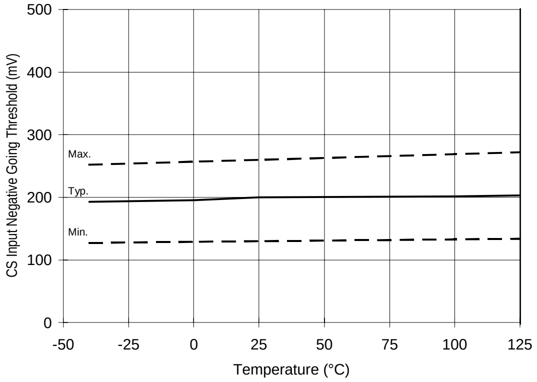


Figure 17A. CS Input Threshold (-) vs. Temperature

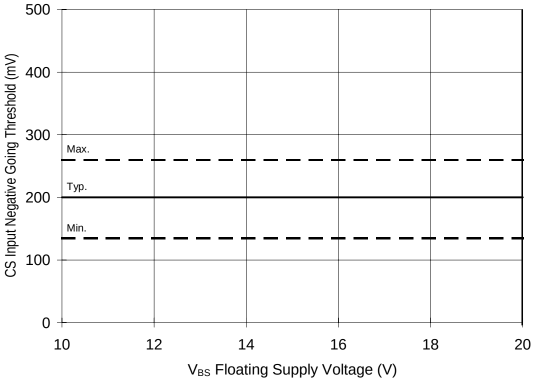


Figure 17B. CS Input Threshold (-) vs. Voltage

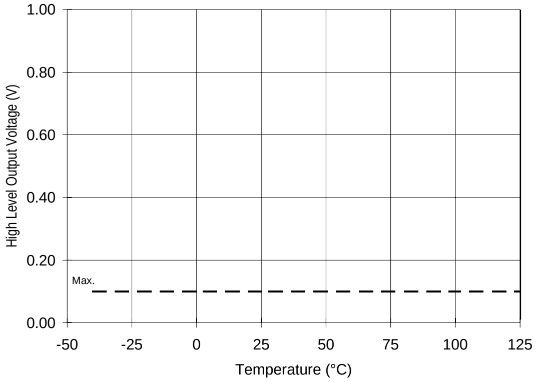


Figure 18A. High Level Output vs. Temperature

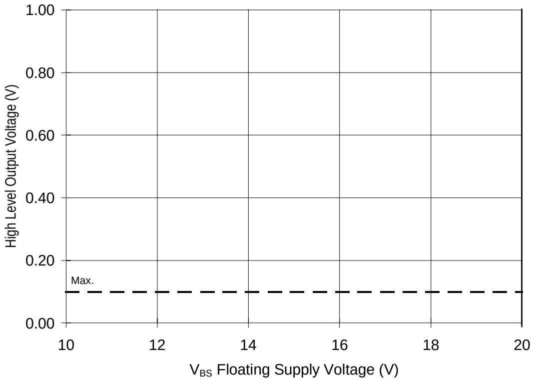


Figure 18B. High Level Output vs. Voltage

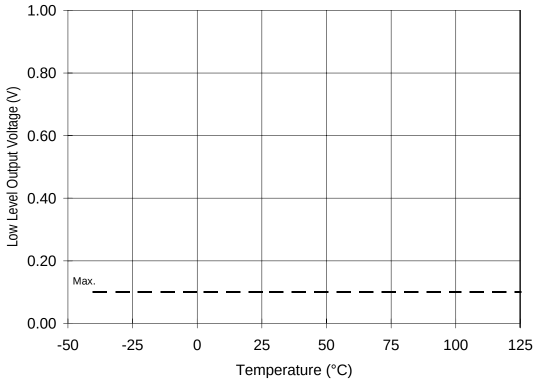


Figure 19A. Low Level Output vs. Temperature

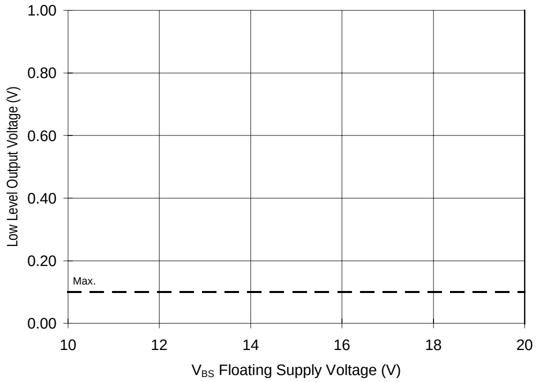


Figure 19B. Low Level Output vs. Voltage

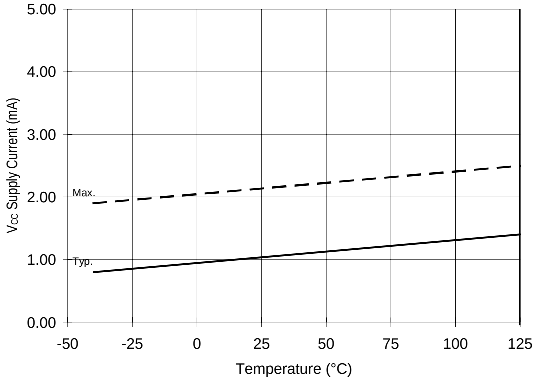


Figure 20A. V_{CC} Supply Current vs. Temperature

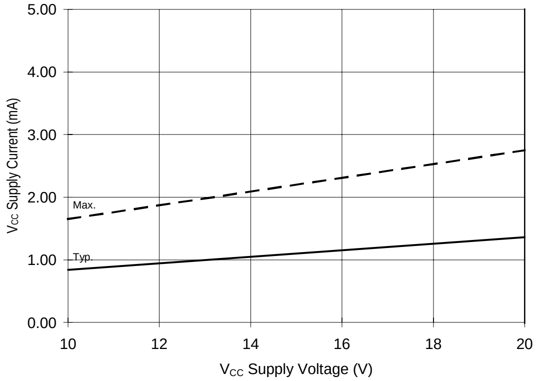


Figure 20B. V_{CC} Supply Current vs. Voltage

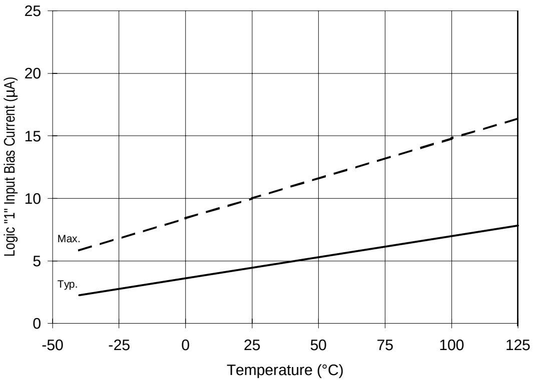


Figure 21A. Logic “1” Input Current vs. Temperature

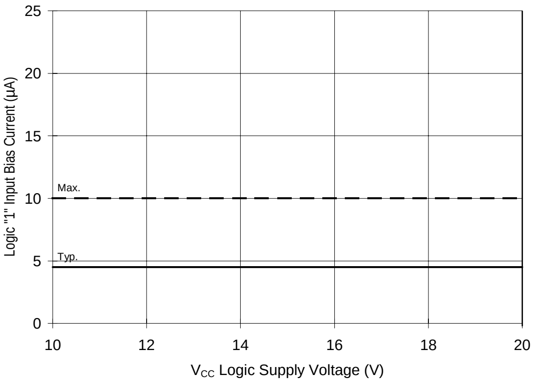


Figure 21B. Logic “1” Input Current vs. Voltage

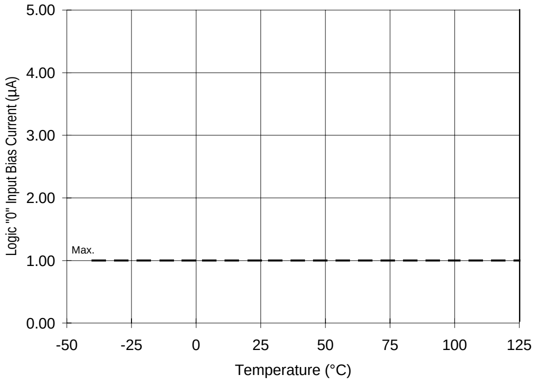


Figure 22A. Logic "0" Input Current vs. Temperature

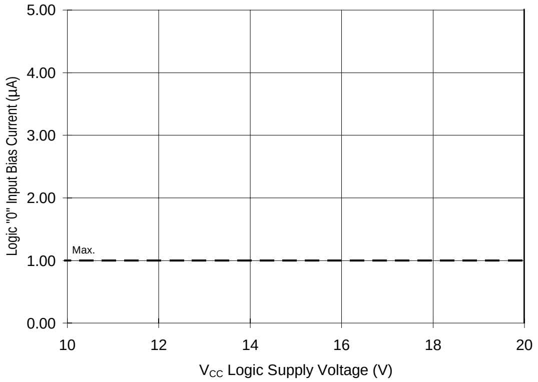


Figure 22B. Logic "0" Input Current vs. Voltage

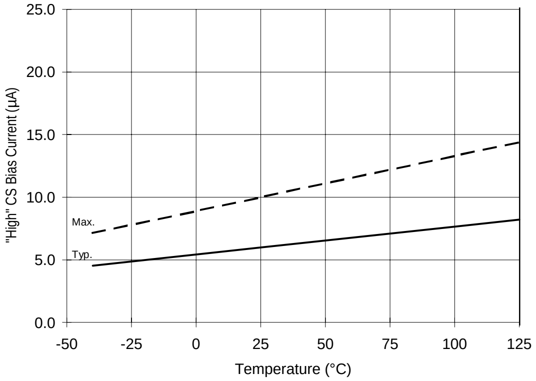


Figure 23A. "High" CS Bias Current vs. Temperature

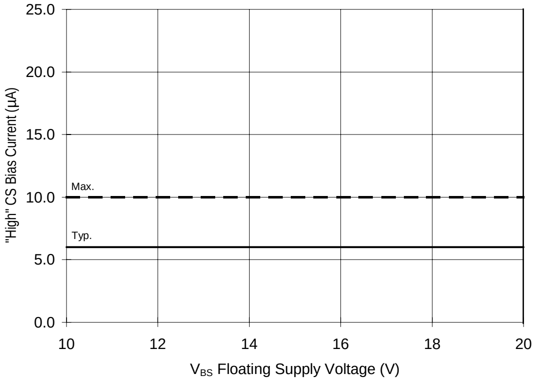


Figure 23B. "High" CS Bias Current vs. Voltage

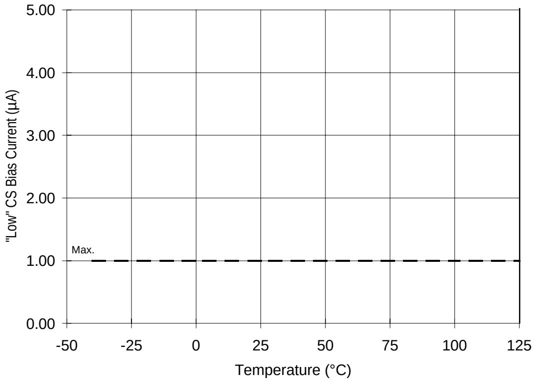


Figure 24A. "Low" CS Bias Current vs. Temperature

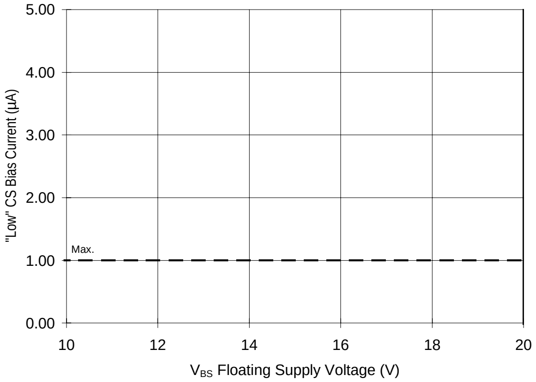


Figure 24B. "Low" CS Bias Current vs. Voltage

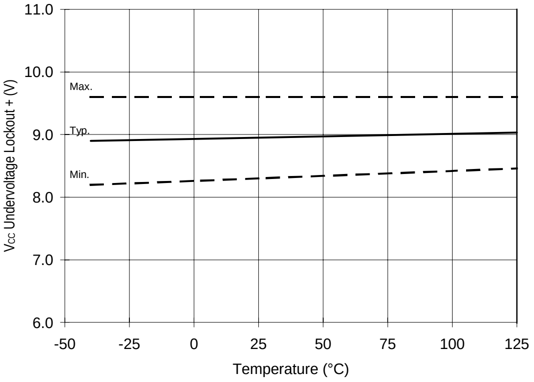


Figure 25. V_{CC} Undervoltage (+) vs. Temperature

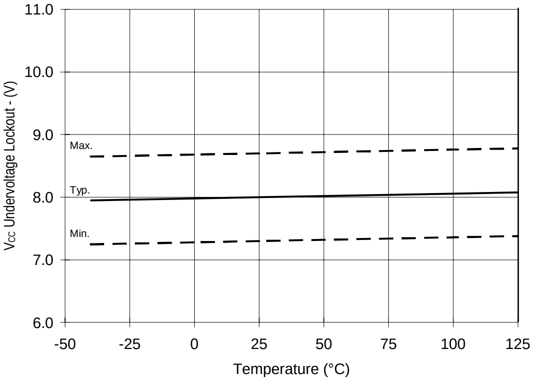


Figure 26. V_{CC} Undervoltage (-) vs. Temperature

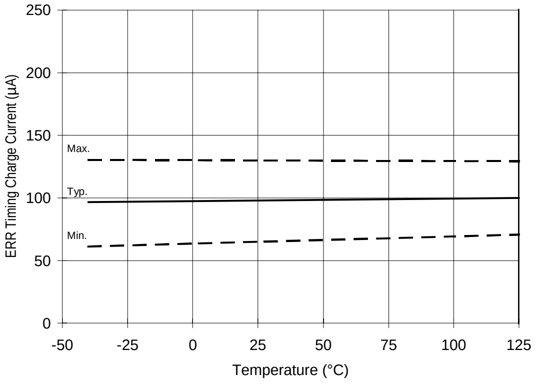


Figure 27A. ERR Timing Charge Current vs. Temperature

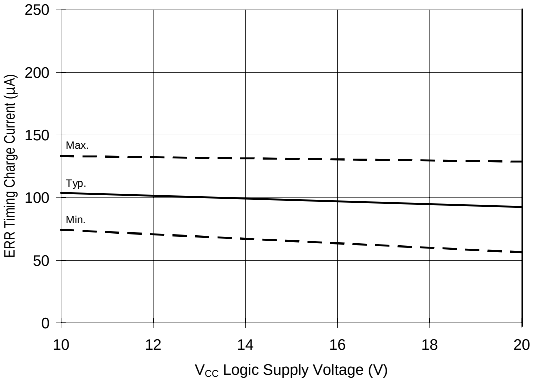


Figure 27B. ERR Timing Charge Current vs. Voltage

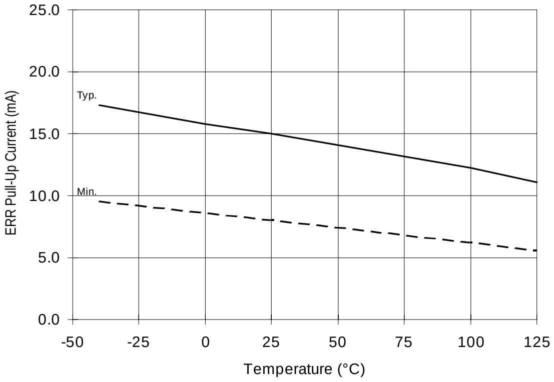


Figure 28A. ERR Pull-Up Current vs. Temperature

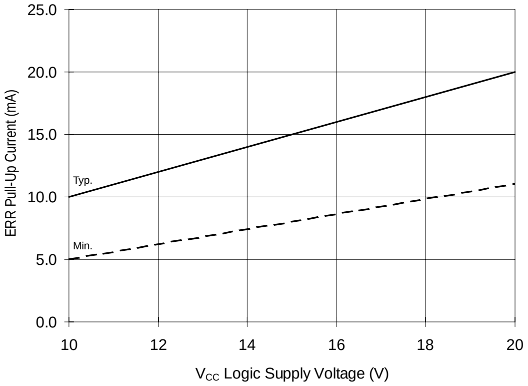


Figure 28B. ERR Pull-Up Current vs. Voltage

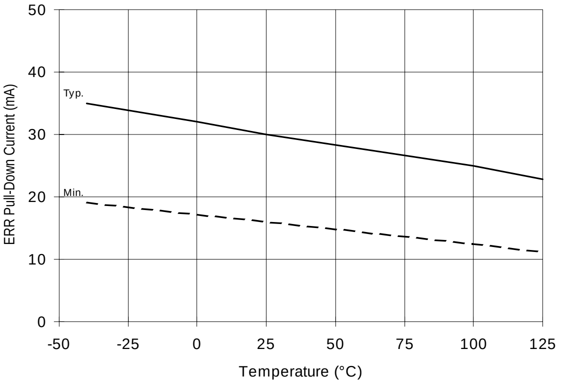


Figure 29A. ERR Pull-Down Current vs.Temperature

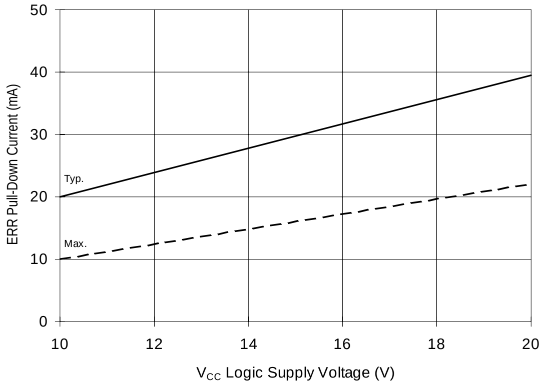


Figure 29B. ERR Pull-Down Current vs. Voltage

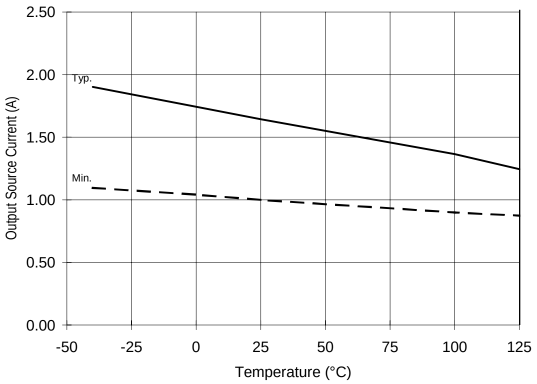


Figure 30A. Output Source Current vs.Temperature

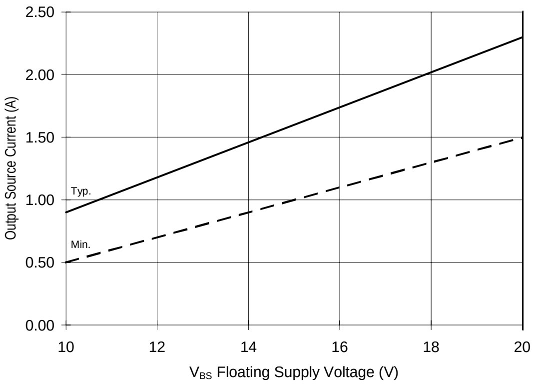


Figure 30B. Output Source Current vs. Voltage

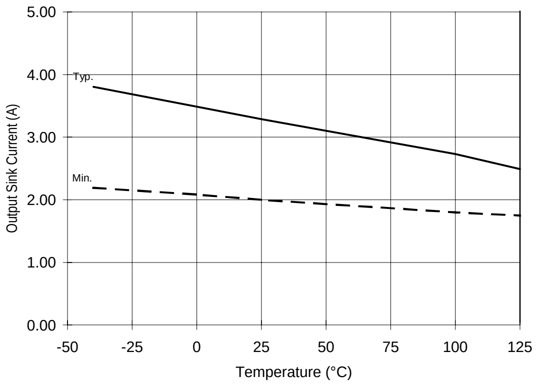


Figure 31A. Output Sink Current vs.Temperature

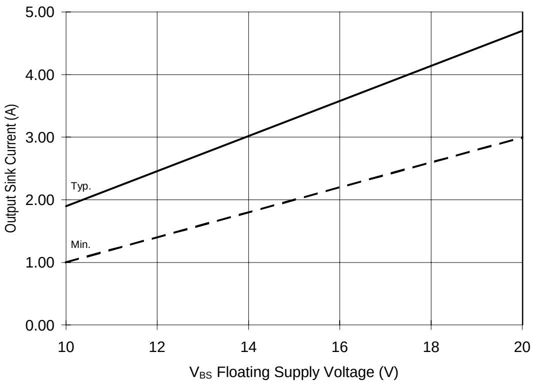


Figure 31B. Output Sink Current vs. Voltage

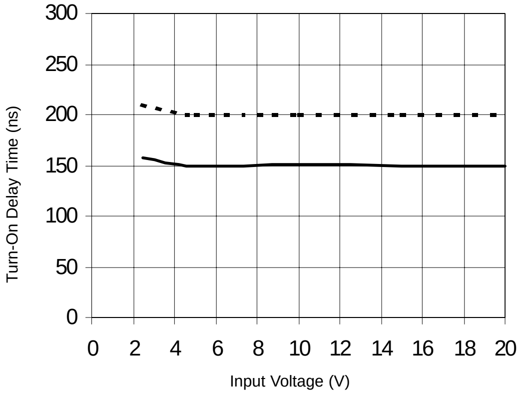


Figure 32A. Turn-On Time vs. Input Voltage

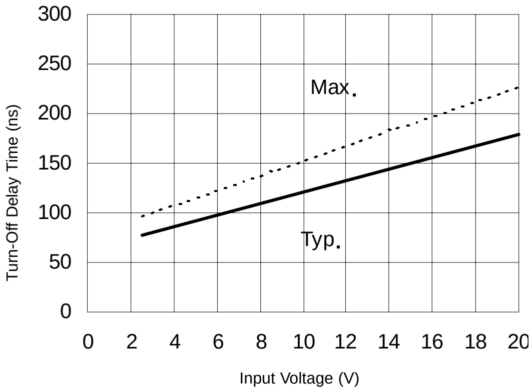


Figure 32B. Turn-Off Time vs. Input Voltage

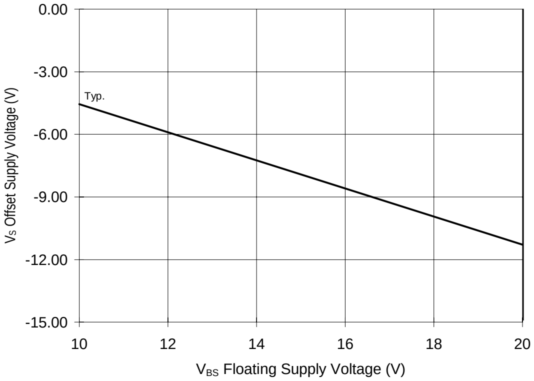
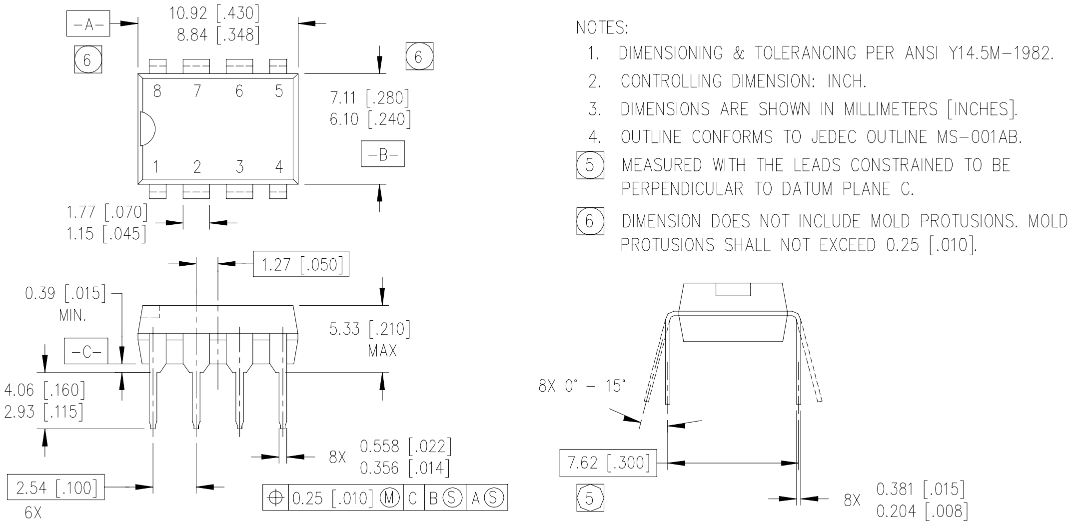


Figure 33. Maximum V_S Negative Offset vs. Supply Voltage

Case outline



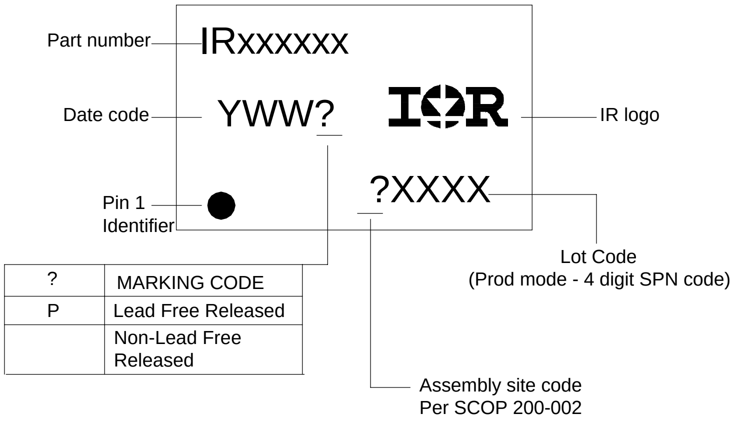
NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-001AB.
5. MEASURED WITH THE LEADS CONSTRAINED TO BE PERPENDICULAR TO DATUM PLANE C.
6. DIMENSION DOES NOT INCLUDE MOLD PROTUSIONS. MOLD PROTUSIONS SHALL NOT EXCEED 0.25 [.010].

8-Lead PDIP

01-6014
01-3003 01 (MS-001AB)

LEADFREE PART MARKING INFORMATION



?	MARKING CODE
P	Lead Free Released
	Non-Lead Free Released

ORDER INFORMATION

Basic Part (Non-Lead Free)
8-Lead PDIP IR2121 order IR2121

Leadfree Part
8-Lead PDIP IR2121 order IR2121PbF

International
IOR Rectifier
IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 Tel: (310) 252-7105

This product has been qualified per industrial level
Data and specifications subject to change without notice. 9/13/2004

EPlast1.ru

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

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.