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Contact us

International IR Rectifier

IR2127(S) / IR2128(S)
IR21271(S) & (PbF)

CURRENT SENSING SINGLE CHANNEL DRIVER

Features

- Floating channel designed for bootstrap operation
  Fully operational to +600V
  Tolerant to negative transient voltage dV/dt immune
- Application- specific gate drive range:
  Motor Drive: 12 to 20V (IR2127/IR2128)
  Automotive: 9 to 20V (IR21271)
- Undervoltage lockout
- 3.3V, 5V and 15V input logic compatible
- $\overline{FAULT}$ lead indicates shutdown has occured
- Output in phase with input (IR2127/IR21271)
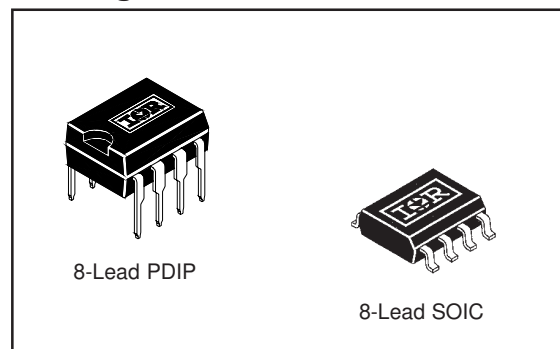- Output out of phase with input (IR2128)
- Avaliable in Lead-Free

Description

The IR2127/IR2128/IR21271(S) is a high voltage, high speed power MOSFET and IGBT driver. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL outputs, down to 3.3V. The protection circuity detects over-current in the driven power transistor and terminates the gate drive voltage. An open drain $\overline{FAULT}$ signal is provided to indicate that an over-current shutdown has occurred. The output driver features a high pulse current buffer stage designed for minimum cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high side or low side configuration which operates up to 600 volts.
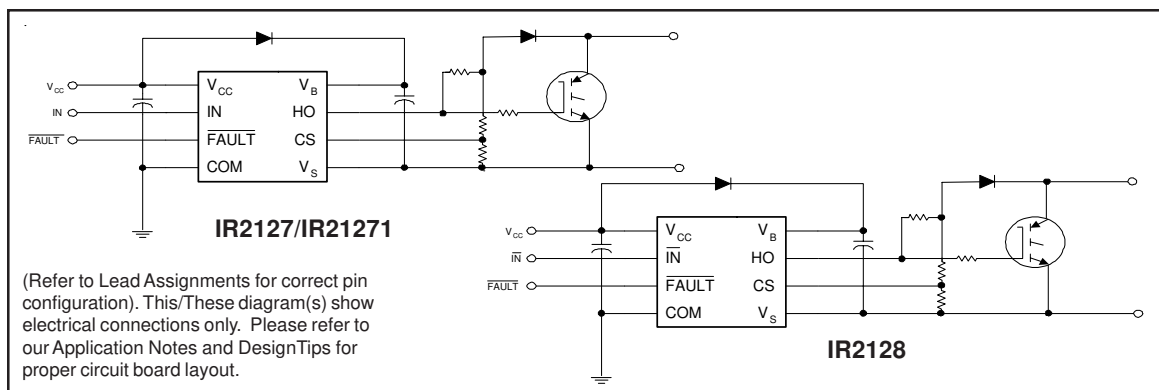
Product Summary

V_{OFFSET}	600V max.	
I_O+/-	200 mA / 420 mA	
V_{OUT}	12 - 20V (IR2127/IR2128)	9 - 20V (IR21271)
V_{CSth}	250 mV or 1.8V	
$t_{on/off}$ (typ.)	200 & 150 ns	

Packages

8-Lead PDIP

8-Lead SOIC

Typical Connection

IR2127/IR21271

(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.

IR2128

IR2127(S) / IR21271(S) / IR2128(S) & (PbF)

International IR Rectifier

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	625	
V_S	High Side Floating 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}	Logic Supply Voltage		-0.3	25	V
V_{IN}	Logic Input Voltage		-0.3	V_{CC} + 0.3	
V_{FLT}	$\overline{FAULT}$ Output Voltage		-0.3	V_{CC} + 0.3	
V_{CS}	Current Sense Voltage		V_S - 0.3	V_B + 0.3	
dV_S/dt	Allowable Offset Supply Voltage Transient		—	50	V/ns
P_D	Package Power Dissipation @ $T_A \leq$ +25°C	(8 Lead DIP)	—	1.0	W
		(8 Lead SOIC)	—	0.625	
Rth_{JA}	Thermal Resistance, Junction to Ambient	(8 Lead DIP)	—	125	°C/W
		(8 Lead SOIC)	—	200	
T_J	Junction Temperature		—	150	
T_S	Storage Temperature		-55	150	°C
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.

Symbol	Definition		Min.	Max.	Units
V_B	High Side Floating Supply Voltage	(IR2127/IR2128)	V_S + 12	V_S + 20	
		(IR21271)	V_S + 9	V_S + 20	
V_S	High Side Floating Offset Voltage		Note 1	600	
V_{HO}	High Side Floating Output Voltage		V_S	V_B	
V_{CC}	Logic Supply Voltage		10	20	V
V_{IN}	Logic Input Voltage		0	V_{CC}	
V_{FLT}	$\overline{FAULT}$ Output Voltage		0	V_{CC}	
V_{CS}	Current Sense Signal Voltage		V_S	V_S + 5	
T_A	Ambient Temperature		-40	125	°C

Note 1: Logic operational for V_S of -5 to +600V. Logic state held for V_S of -5V 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}) = 15V, C_L = 1000 pF and T_A = 25°C unless otherwise specified. The dynamic electrical characteristics are measured using the test circuit shown in Figure 3.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-On Propagation Delay	—	200	250		V_S = 0V
t_{off}	Turn-Off Propagation Delay	—	150	200		V_S = 600V
t_r	Turn-On Rise Time	—	80	130		
t_f	Turn-Off Fall Time	—	40	65	ns	
t_{bl}	Start-Up Blanking Time	500	700	900		
t_{cs}	CS Shutdown Propagation Delay	—	240	360		
t_{flt}	CS to FAULT Pull-Up Propagation Delay	—	340	510		

Static Electrical Characteristics

V_{BIAS} (V_{CC}, V_{BS}) = 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.

Symbol	Definition		Min.	Typ.	Max.	Units	Test Conditions
V_{IH}	Logic "1" Input Voltage	(IR2127/IR21271)	3.0	—	—		
	Logic "0" Input Voltage	(IR2128)				V	
V_{IL}	Logic "0" Input Voltage	(IR2127/IR21271)			0.8		V_{CC} = 10V to 20V
	Logic "1" Input Voltage	(IR2128)					
V_{CSTH+}	CS Input Positive	(IR2127/IR2128)	180	250	320	mV	
	Going Threshold	(IR21271)	—	1.8	—	V	
V_{OH}	High Level Output Voltage, V_{BIAS} - VO		—	—	100	mV	IO = 0A
V_{OL}	Low Level Output Voltage, VO		—	—	100		IO = 0A
I_{LK}	Offset Supply Leakage Current		—	—	50		V_B = V_S = 600V
I_{QBS}	Quiescent V_{BS} Supply Current		—	200	400		V_{IN} = 0V or 5V
I_{QCC}	Quiescent V_{CC} Supply Current		—	60	120		
I_{IN+}	Logic "1" Input Bias Current		—	7.0	15	µA	V_{IN} = 5V
I_{IN-}	Logic "0" Input Bias Current		—	—	1.0		V_{IN} = 0V
I_{CS+}	"High" CS Bias Current		—	—	1.0		V_{CS} = 3V
I_{CS-}	"High" CS Bias Current		—	—	1.0		V_{CS} = 0V
V_{BSUV+}	V_{BS} Supply Undervoltage	(IR2127/IR2128)	8.8	10.3	11.8		
	Positive Going Threshold	(IR21271)	6.3	7.2	8.2	V	
V_{BSUV-}	V_{BS} Supply Undervoltage	(IR2127/IR2128)	7.5	9.0	10.6		
	Negative Going Threshold	(IR21271)	6.0	6.8	7.7		
I_{O+}	Output High Short Circuit Pulsed Current		200	250	—		V_O = 0V, V_{IN} = 5V PW ≤ 10 µs
I_{O-}	Output Low Short Circuit Pulsed Current		420	500	—	mA	V_O = 15V, V_{IN} = 0V PW ≤ 10 µs
Ron, FLT	FAULT - Low on Resistance		—	125	—	Ω	

IR2127(S) / IR21271(S) / IR2128(S) & (PbF)

Functional Block Diagram IR2127/IR21271

Functional Block Diagram IR2128

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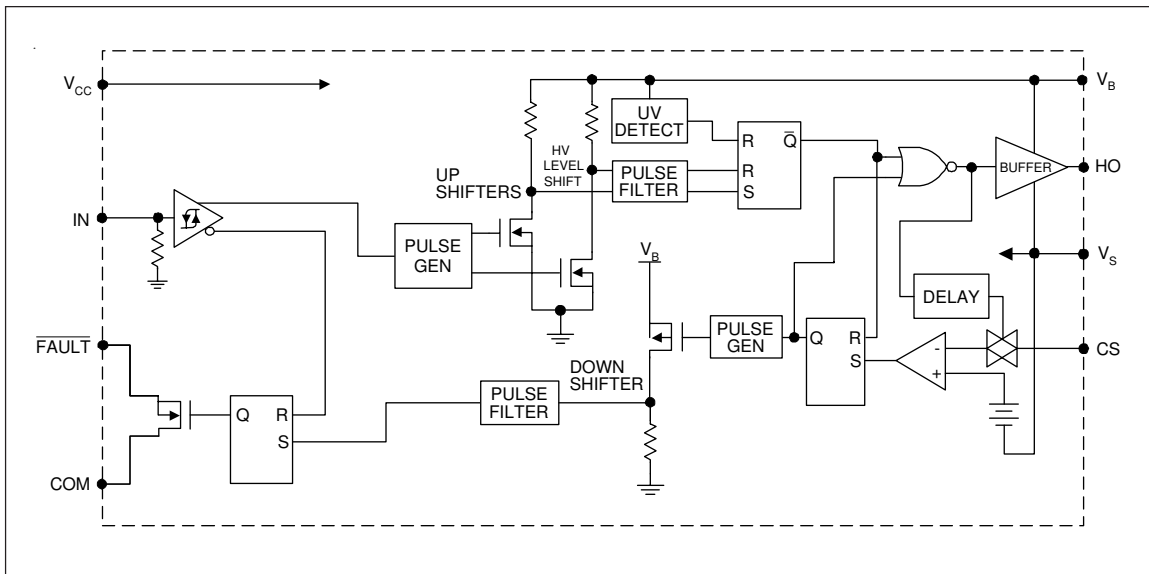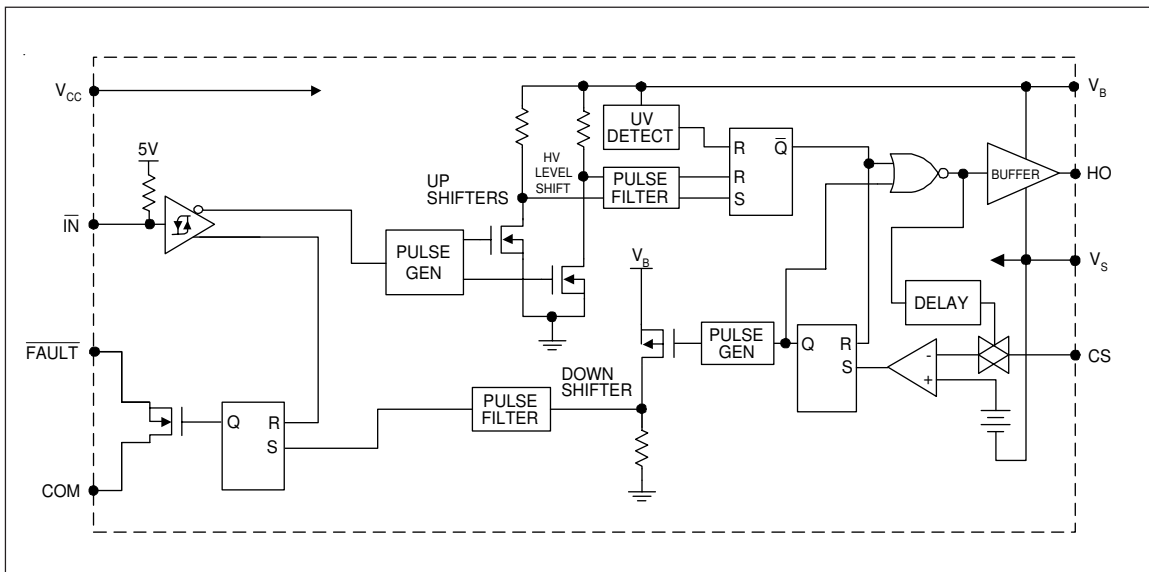
Lead Definitions

Symbol	Description
V_{CC}	Logic and gate drive supply
IN	Logic input for gate driver output (HO), in phase with HO (IR2127/IR21271) out of phase with HO (IR2128)
$\overline{FAULT}$	Indicates over-current shutdown has occurred, negative logic
COM	Logic ground
V_B	High side floating supply
HO	High side gate drive output
V_S	High side floating supply return
CS	Current sense input to current sense comparator

Lead Assignments

8 Lead PDIP

IR2127/IR21271

8 Lead SOIC

IR2127S/IR21271S

8 Lead PDIP

IR2128

8 Lead SOIC

IR2128S
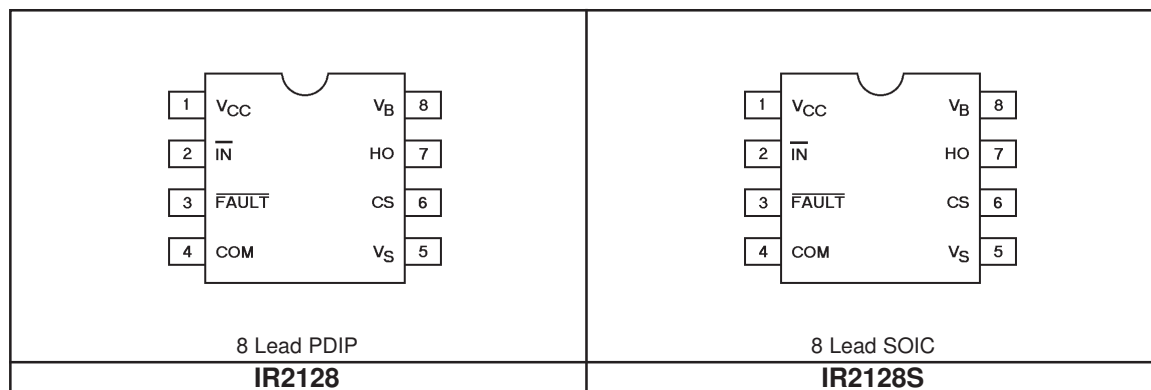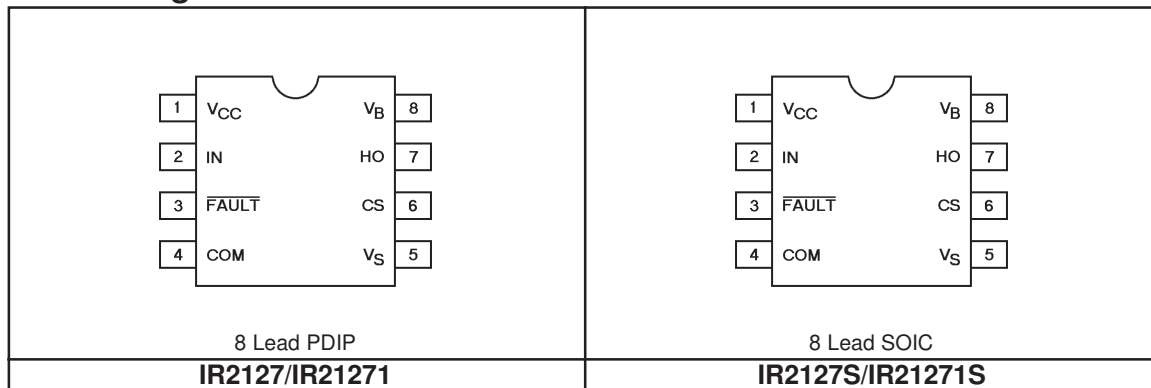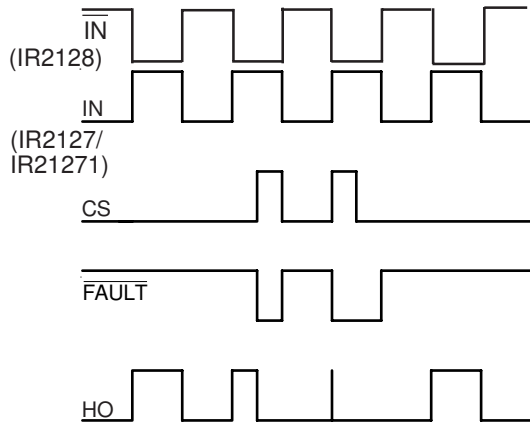
Figure 1. Input/Output Timing Diagram
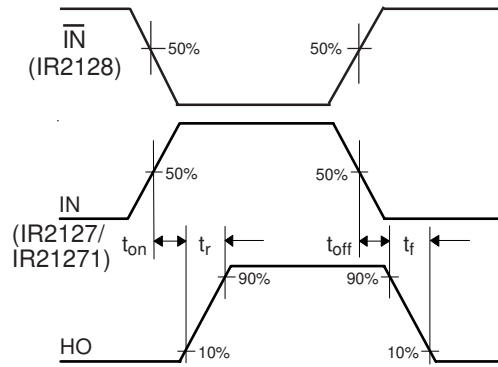
Figure 2. Switching Time Waveform Definition
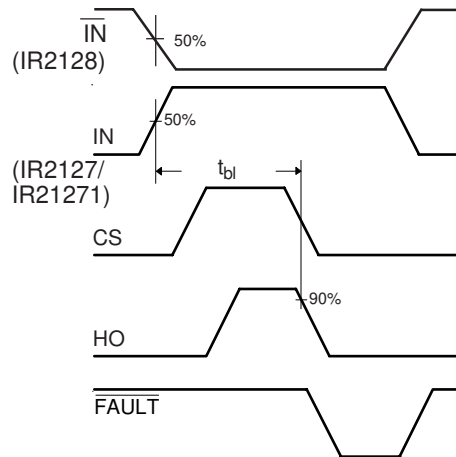
Figure 3. Start-up Blanking Time Waveform Definitions
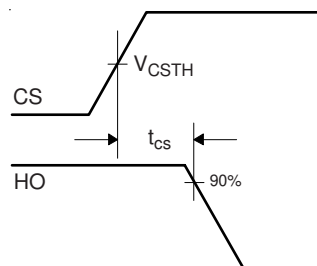
Figure 4. CS Shutdown Waveform Definitions
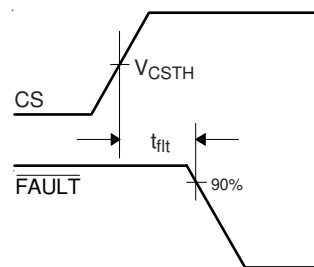
Figure 5. CS to $\overline{\text{FAULT}}$ Waveform Definitions

International **IR** Rectifier

IR2127(S) / IR21271(S) / IR2128(S) & (PbF)
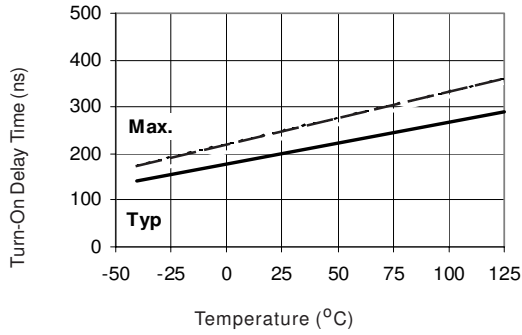
Figure 10A Turn-On Time vs. Temperature
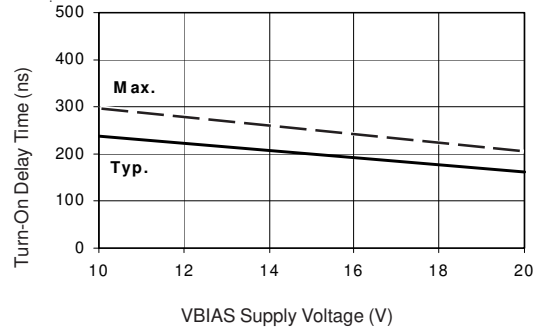
Figure 10B Turn-On Time vs. Supply Voltage
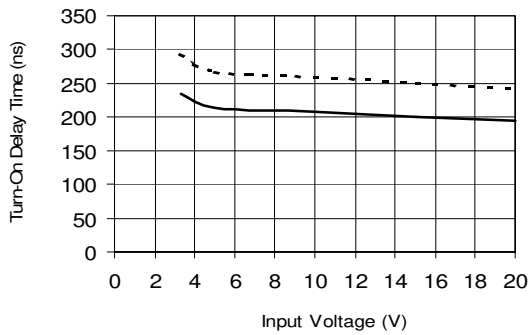
Figure 10C Turn-On Time vs. Input Voltage
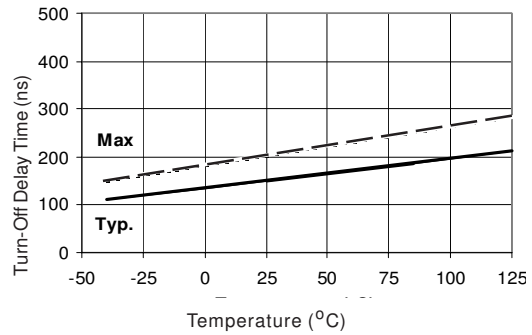
Figure 11A Turn-Off Time vs. Temperature
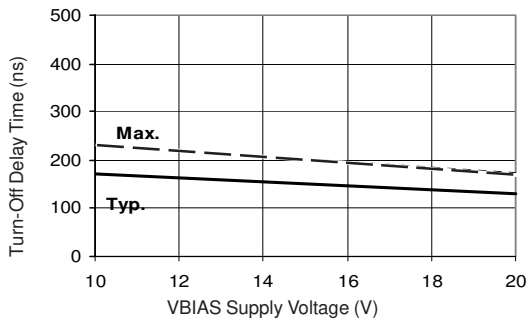
Figure 11B Turn-Off Time vs. Supply Voltage
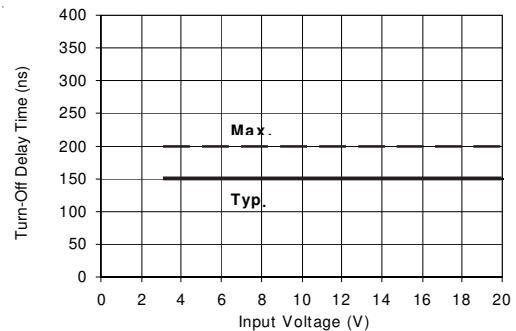
Figure 11C Turn-OffTime vs. Input Voltage
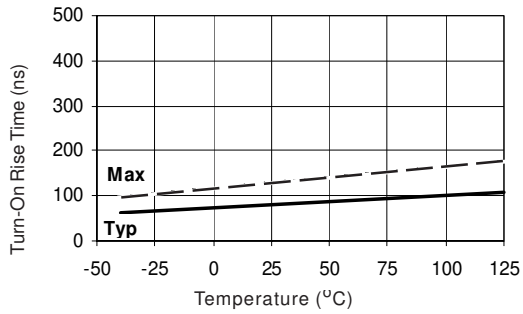
Figure 12A Turn-On Rise Time vs. Temperature
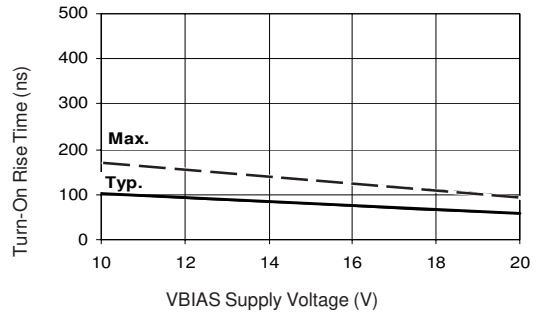
Figure 12B Turn-On Rise Time vs. Supply Voltage
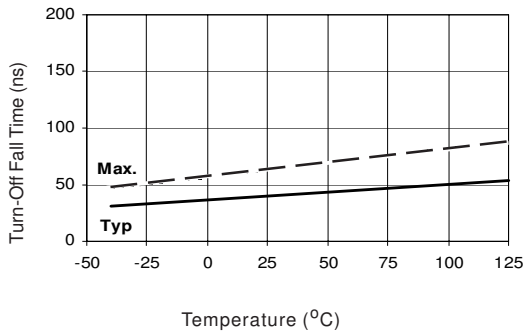
Figure 13A Turn-Off Fall Time vs. Temperature
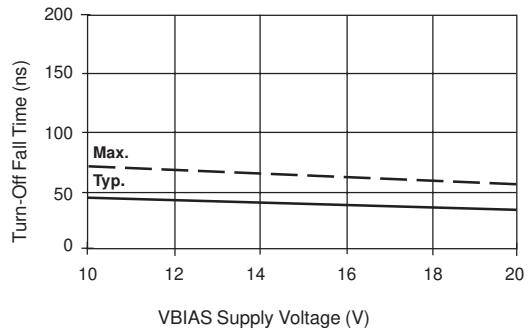
Figure 13B Turn-Off Fall Time vs. Voltage
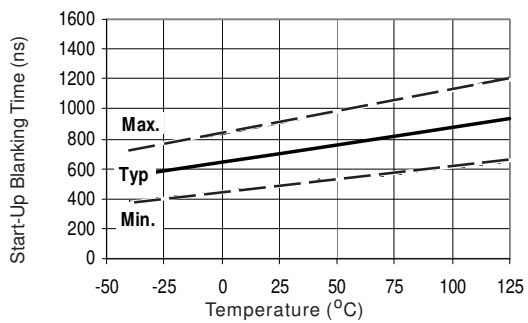
Figure 14A Start-Up Blanking Time vs. Temperature
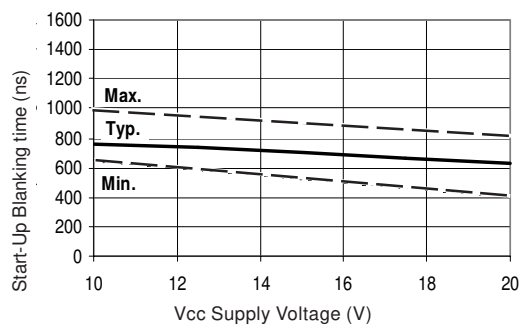
**Figure 14B Start-Up Blanking Time
vs Voltage**
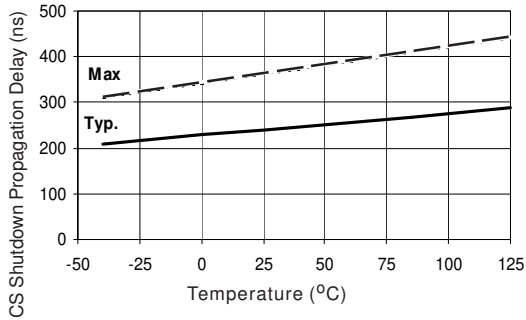
Figure 15A CS Shutdown Propagation Delay vs. Temperature
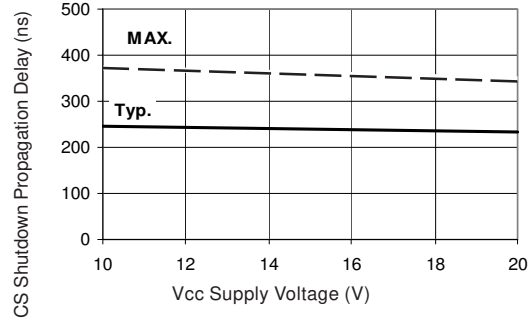
Figure 15B CS Shutdown Propagation Delay vs. Voltage
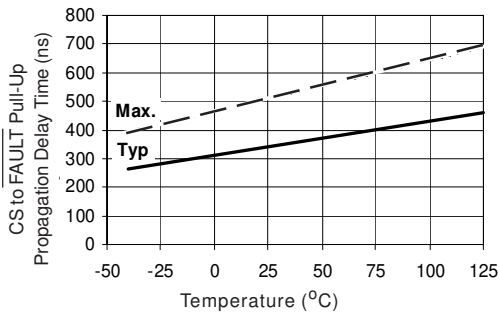
Figure 16A CS to $\overline{\text{FAULT}}$ Pull-Up Propagation Delay vs. Temperature
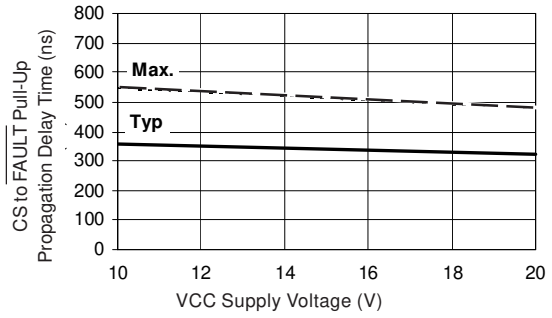
Figure 16B CS to $\overline{\text{FAULT}}$ Pull-Up Propagation Delay vs. Voltage
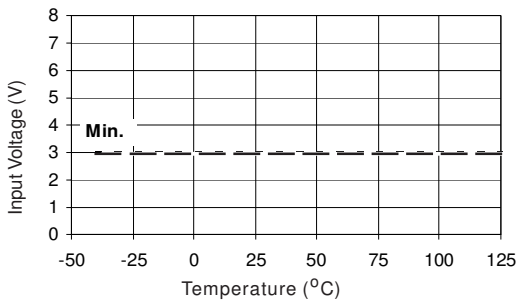
Figure 17A Logic "1" Input Voltage (IR2127) Logic "0" Input Voltage (IR2128) vs Temperature
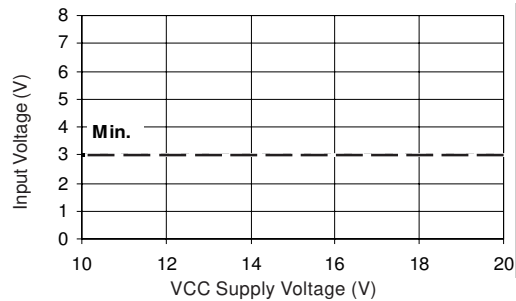
**Figure 17B Logic "1" Input Voltage (IR2127) Logic "0" Input Voltage (IR2128) vs Voltage**

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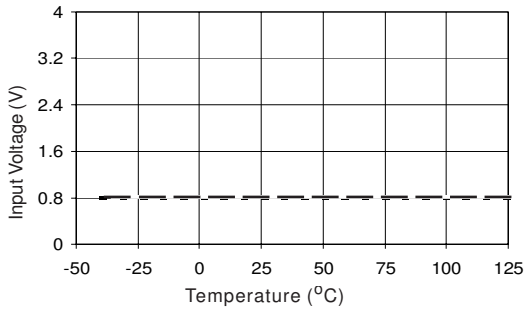
Figure 18A Logic "0" Input Voltage (IR2127)
Logic "1" Input Voltage (IR2128)
vs Temperature
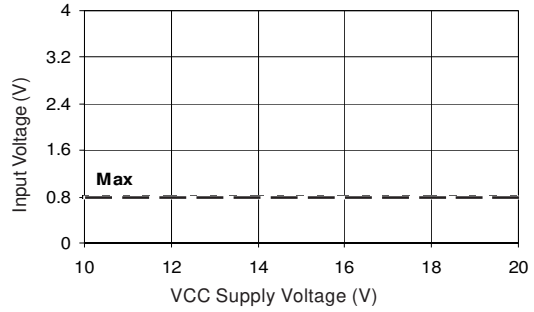
Figure 18B Logic "0" Input Voltage (IR2127)
Logic "1" Input Voltage (IR2128)
vs Voltage
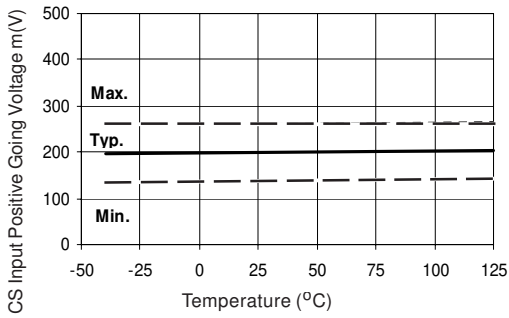
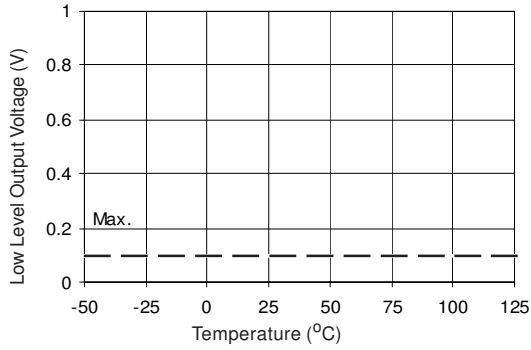**Figure 19A CS Input Positive Going Voltage**
vs Temperature (IR2127/IR2128)
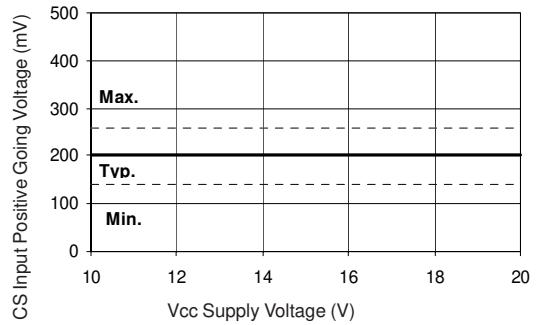
Figure 19B CS Input Positive Going Voltage
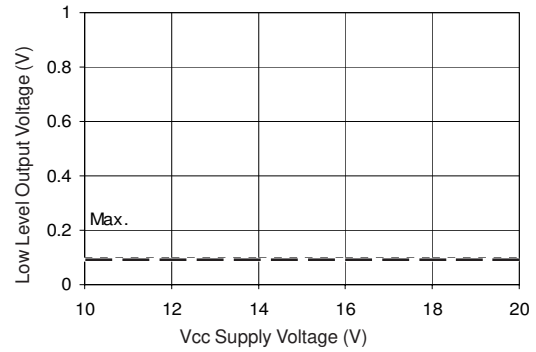**vs Voltage (IR2127/IR2128)**
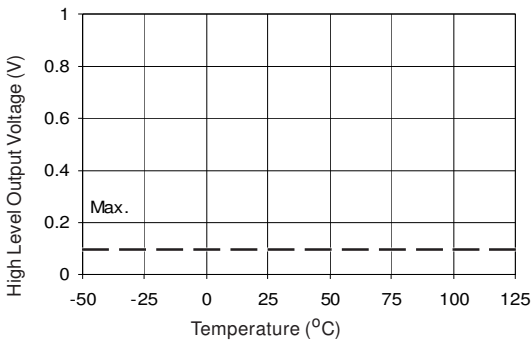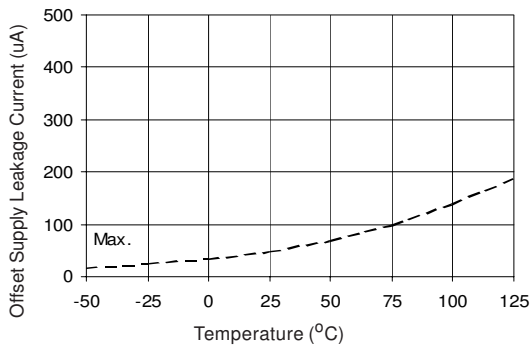

Figure 20A High Level Output vs Temperature
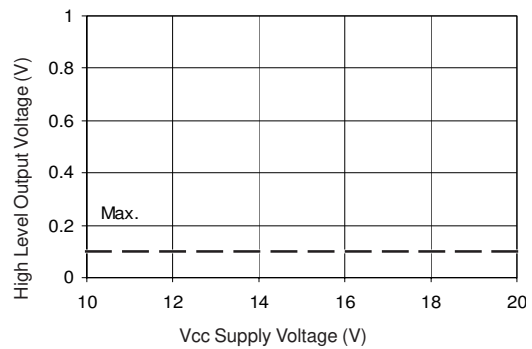
Figure 20B High Level Output vs Voltage
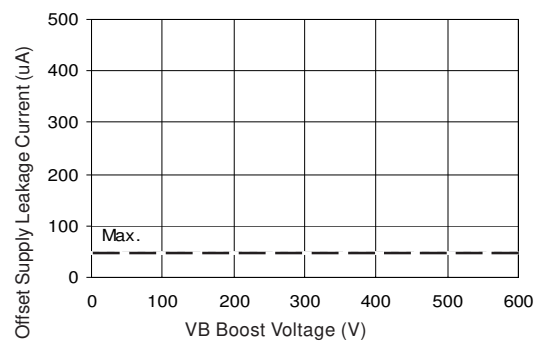
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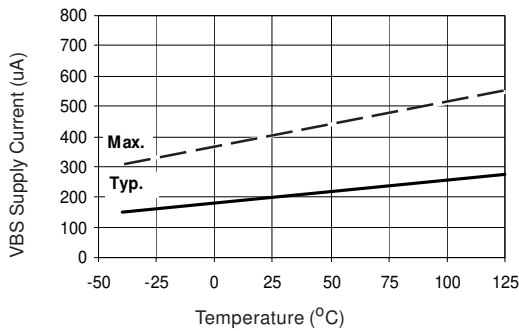**Figure 21A Low Level Output vs Temperature**

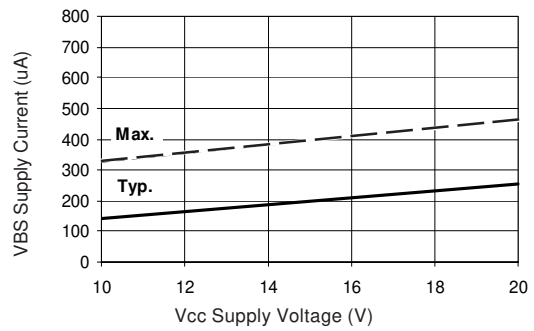**Figure 21B Low Level Output vs Voltage**

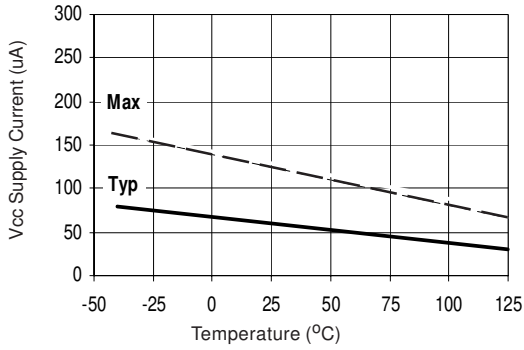**Figure 22A Offset Supply Current
vs Temperature**

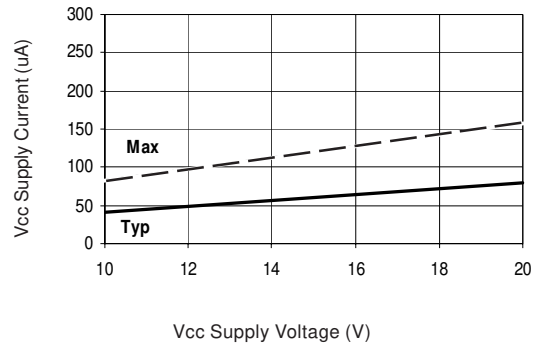**Figure 22B Offset Supply Current
vs Voltage**

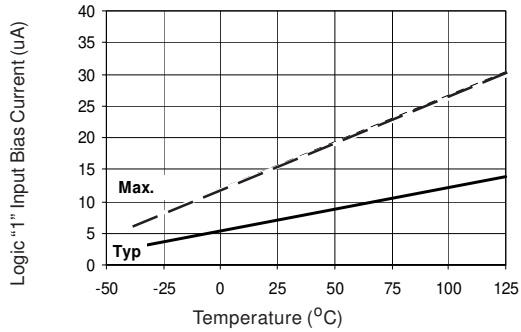**Figure 23A VBS Supply Current
vs Temperature**

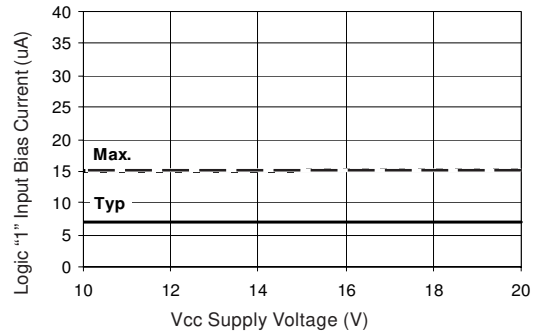**Figure 23B VBS Supply Current
vs Voltage**

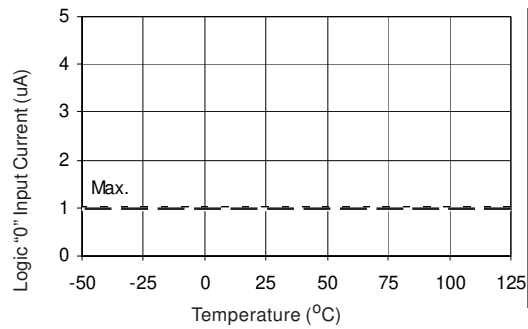**Figure 24A Vcc Supply Current
vs Temperature**

**Figure 24B Vcc Supply Current
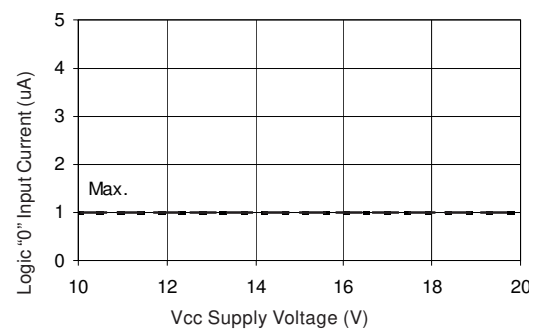vs Voltage**

**Figure 25A Logic "1" Input Current
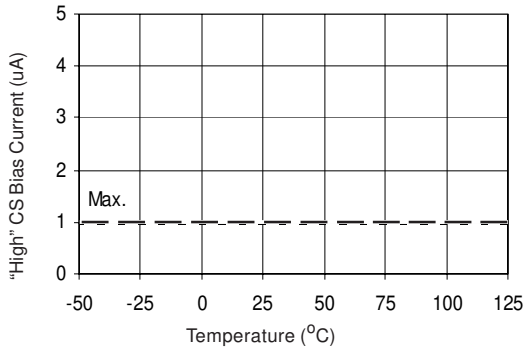vs Temperature**

**Figure 25B Logic "1" Input Current
vs Voltage**

**Figure 26A Logic "0" Input Current
vs Temperature**

**Figure 26B Logic "0" Input Current
vs Voltage**

International IΩR Rectifier
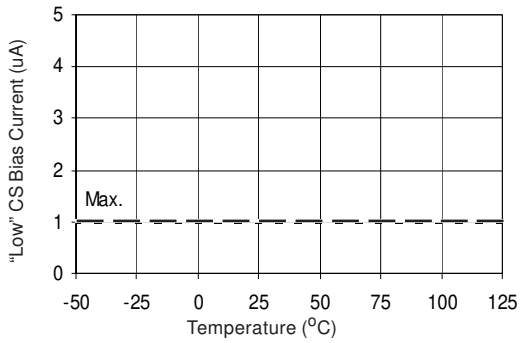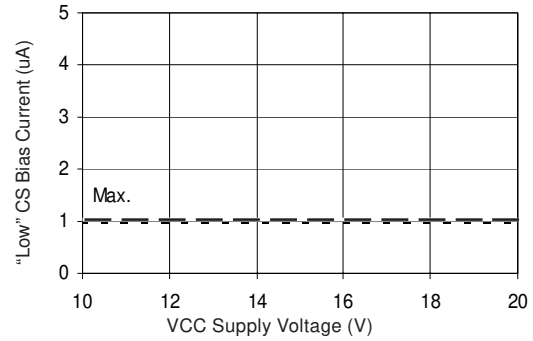
Figure 27A "High" CS Bias Current vs Temperature
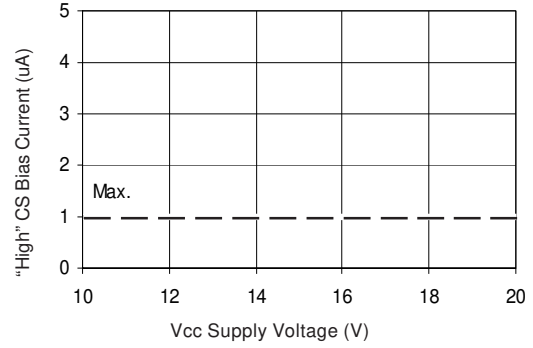
Figure 27B "High" CS Bias Current vs Voltage

Figure 28A "Low" CS Bias Current vs Temperature

Figure 28B "Low" CS Bias Current vs Voltage
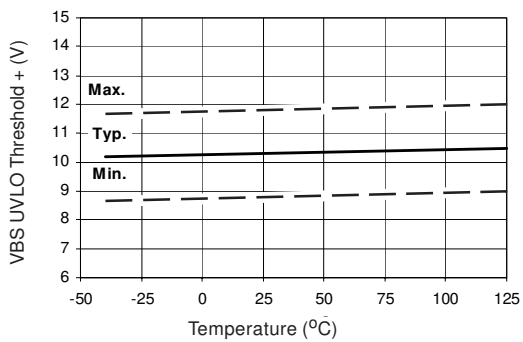
Figure 29A VBS Undervoltage Threshold (+) vs Temperature (IR2127/IR2128)
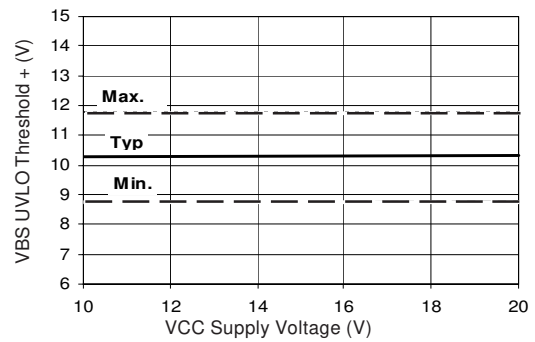
Figure 29B VBS Undervoltage Threshold (+) vs Voltage (IR2127/IR2128)

International
IGR Rectifier

**Figure 30A VBS Undervoltage Threshold (-)
vs Temperature (IR2127/IR2128)**

**Figure 30B VBS Undervoltage Threshold (-)
vs Voltage (IR2127/IR2128)**

Figure 31A Output Source Current vs Temperature

Figure 31B Output Source Current vs Voltage

Figure 32A Output Sink Current vs Temperature
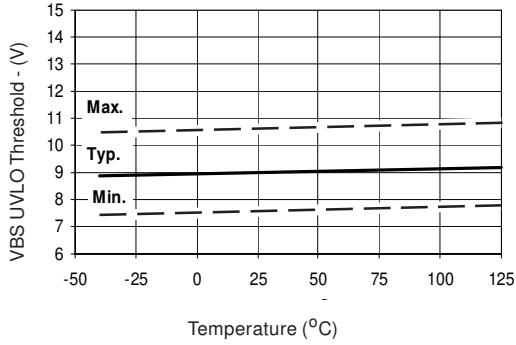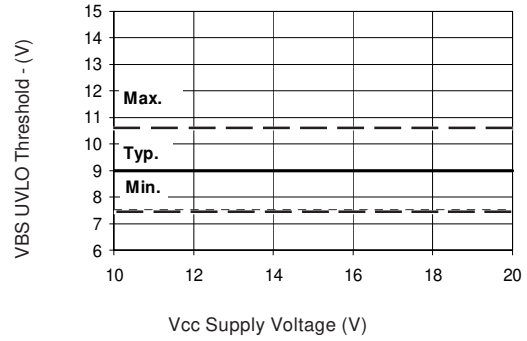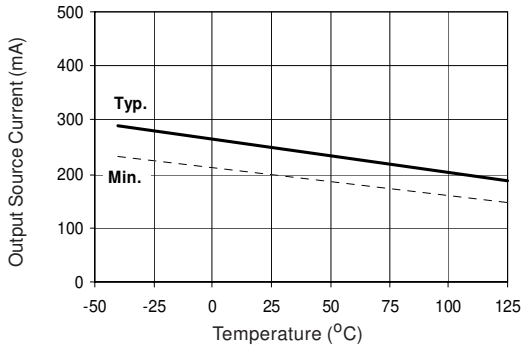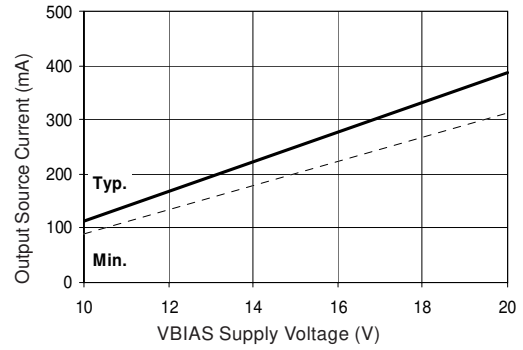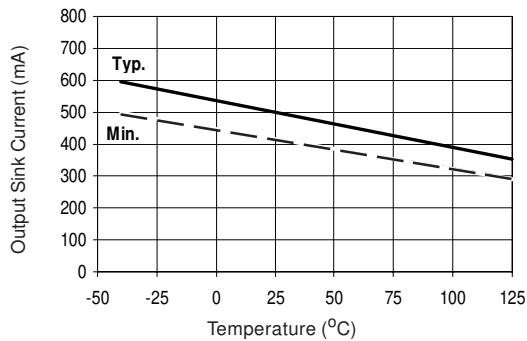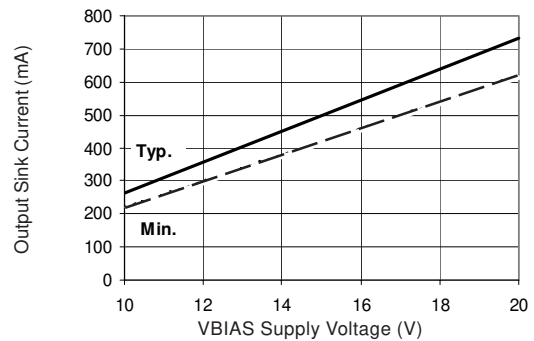
Figure 32B Output Sink Current vs Voltage

International IGR Rectifier

Case outlines

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)

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°

NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.010).
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

8-Lead SOIC

01-6027
01-0021 11 (MS-012AA)

IR2127(S) / IR21271(S) / IR2128(S) & (PbF)

LEADFREE PART MARKING INFORMATION

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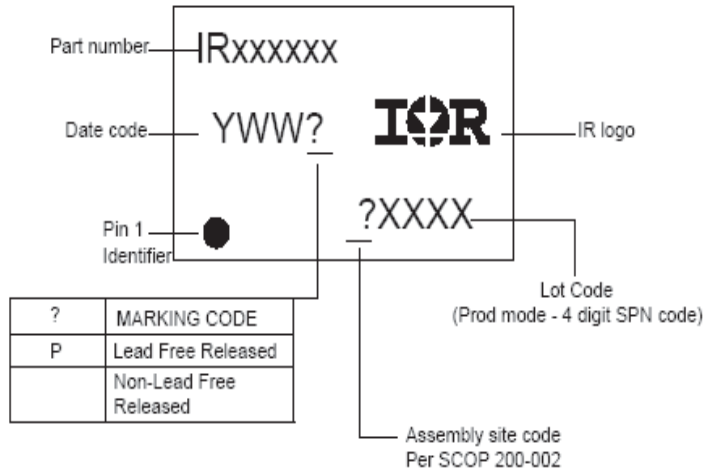
ORDER INFORMATION

Basic Part (Non-Lead Free)

8-Lead PDIP IR2127   order IR2127
8-Lead SOIC IR2127S   order IR2127S
8-Lead PDIP IR21271   order IR21271
8-Lead SOIC IR21271S order IR21271S
8-Lead PDIP IR2128   order IR2128
8-Lead SOIC IR2128S   order IR2128S

Lead-Free Part

8-Lead PDIP IR2127   order IR2127PbF
8-Lead SOIC IR2127S   order IR2127SPbF
8-Lead PDIP IR21271   order IR21271PbF
8-Lead SOIC IR21271S order IR21271SPbF
8-Lead PDIP IR2128   order IR2128PbF
8-Lead SOIC IR2128S   order IR2128SPbF