Data Sheet No. PD60146 Rev O

International
IOR Rectifier

IR2117(S)/IR2118(S) & (PbF)

SINGLE CHANNEL DRIVER

Features

- Floating channel designed for bootstrap operation
  Fully operational to +600V
  Tolerant to negative transient voltage
  dV/dt immune
- Gate drive supply range from 10 to 20V
- Undervoltage lockout
- CMOS Schmitt-triggered inputs with pull-down
- Output in phase with input (IR2117) or out of phase with input (IR2118)
- Also available LEAD-FREE

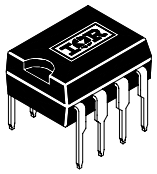
Product Summary

V_{OFFSET}	600V max.
I_O+/-	200 mA / 420 mA
V_{OUT}	10 - 20V
$t_{on/off}$ (typ.)	125 & 105 ns

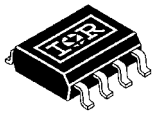
Description

The IR2117/IR2118(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 outputs. 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 or low side configuration which operates up to 600 volts.

Packages

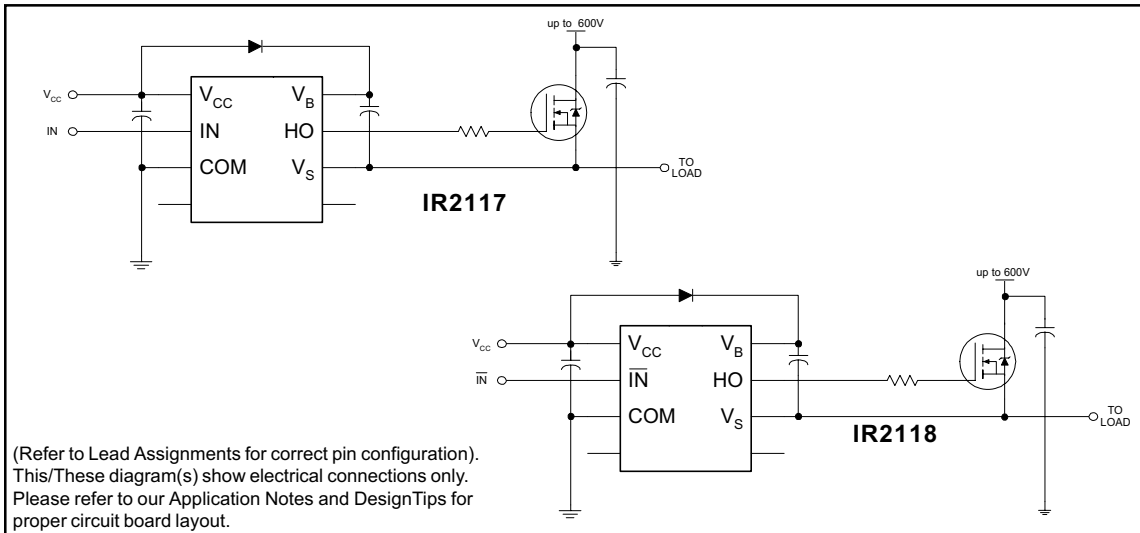


8-Lead PDIP
IR2117/IR2118



8-Lead SOIC
IR2117S/IR2118S

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. Additional information is shown in Figures 5 through 8.

Symbol	Definition		Min.	Max.	Units
V_B	High side floating supply voltage		-0.3	625	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}	Logic supply voltage		-0.3	25	
V_{IN}	Logic input voltage		-0.3	V_{CC} + 0.3	
dV_s/dt	Allowable offset supply voltage transient (figure 2)		—	50	V/ns
P_D	Package power dissipation @ $T_A \leq +25°C$	(8 lead PDIP)	—	1.0	W
		(8 lead SOIC)	—	0.625	
Rth_{JA}	Thermal resistance, junction to ambient	(8 lead PDIP)	—	125	°C/W
		(8 lead SOIC)	—	200	
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.

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	600	
V_{HO}	High side floating output voltage	V_S	V_B	
V_{CC}	Logic supply voltage	10	20	
V_{IN}	Logic input voltage	0	V_{CC}	
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).

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.

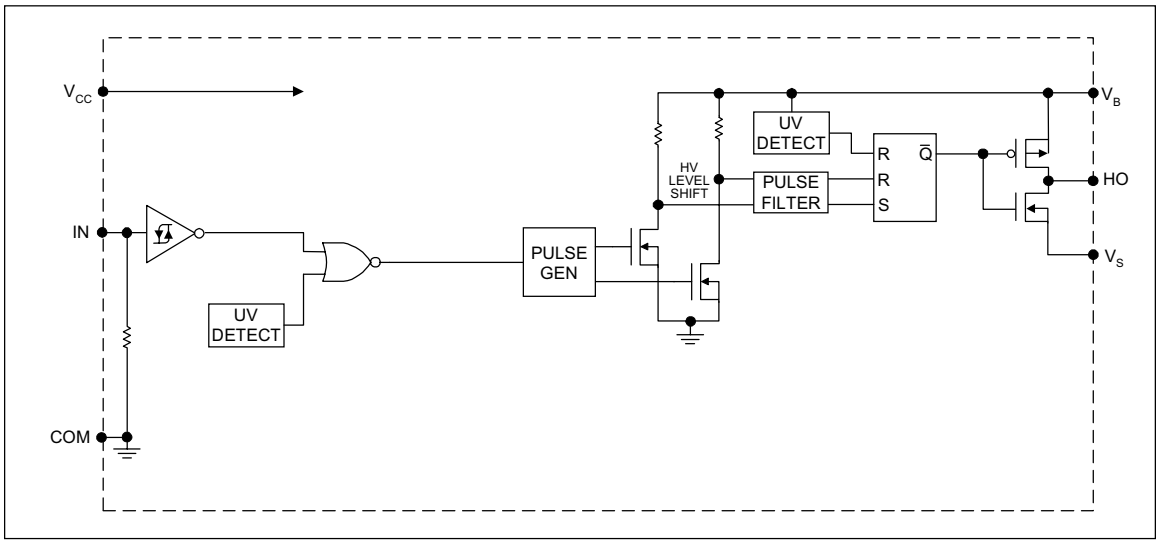
Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-on propagation delay	—	125	200	ns	V_S = 0V
t_{off}	Turn-off propagation delay	—	105	180		V_S = 600V
t_r	Turn-on rise time	—	80	130		
t_f	Turn-off fall time	—	40	65		

Static Electrical Characteristics

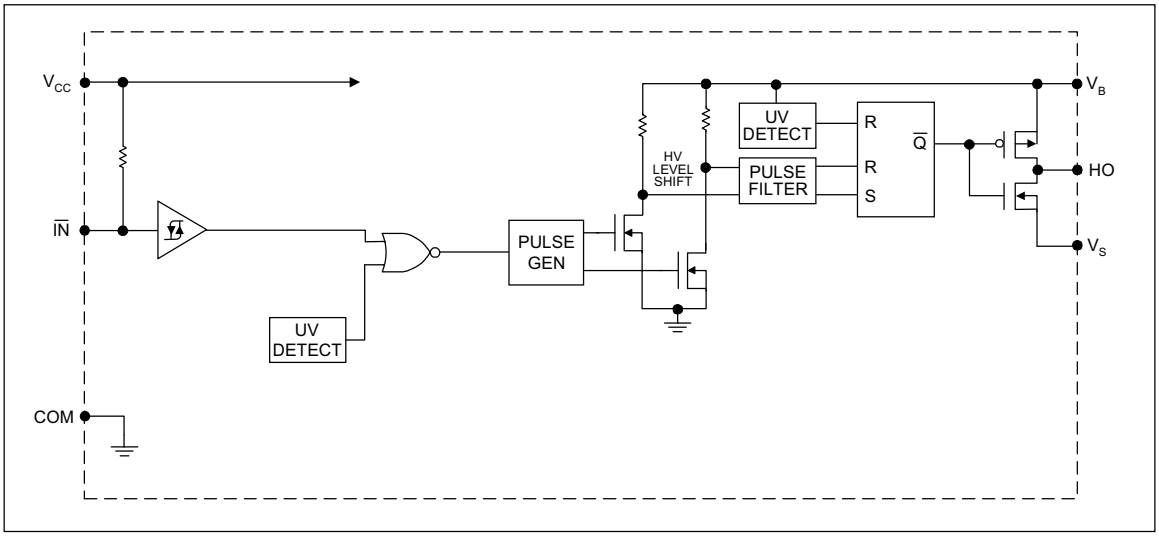
V_{BIAS} (V_{CC}, V_{BS}) = 15V and T_A = 25°C unless otherwise specified. The V_{IN}, V_{TH} and I_{IN} parameters are referenced to COM. The V_O and I_O parameters are referenced to COM and are applicable to the respective output leads: HO or LO.

Symbol	Definition		Min.	Typ.	Max.	Units	Test Conditions
V_{IH}	input voltage - logic “1” (IR2117) logic “0” (IR2118)		9.5	—	—	V	
V_{IL}	Input voltage - logic “0” (IR2117) logic “1” (IR2118)		—	—	6.0		
V_{OH}	High level output voltage, V_{BIAS} - V_O		—	—	100	mV	I_O = 0A
V_{OL}	Low level output voltage, V_O		—	—	100		I_O = 0A
I_{LK}	Offset supply leakage current		—	—	50	µA	V_B = V_S = 600V
I_{QBS}	Quiescent V_{BS} supply current		—	50	240		V_{IN} = 0V or V_{CC}
I_{QCC}	Quiescent V_{CC} Supply Current		—	70	340		V_{IN} = 0V or V_{CC}
I_{IN+}	Logic “1” input bias current	(IR2117)	—	20	40		V_{IN} = V_{CC}
		(IR2118)					V_{IN} = 0V
I_{IN-}	Logic “0” input bias current	(IR2117)	—	—	1.0		V_{IN} = 0V
		(IR2118)					V_{IN} = V_{CC}
V_{BSUV+}	V_{BS} supply undervoltage positive going threshold		7.6	8.6	9.6	V	
V_{BSUV-}	V_{BS} supply undervoltage negative going threshold		7.2	8.2	9.2		
V_{CCUV+}	V_{CC} supply undervoltage positive going threshold		7.6	8.6	9.6		
V_{CCUV-}	V_{CC} supply undervoltage negative going threshold		7.2	8.2	9.2		
I_{O+}	Output high short circuit pulsed current		200	250	—	mA	V_O = 0V V_{IN} = Logic “1” PW ≤ 10 µs
I_{O-}	Output low short circuit pulsed current		420	500	—		V_O = 15V V_{IN} = Logic “0” PW ≤ 10 µs

Functional Block Diagram (IR2117)



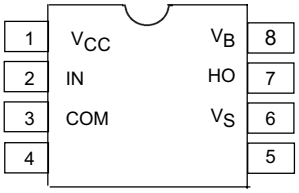
Functional Block Diagram (IR2118)



Lead Definitions

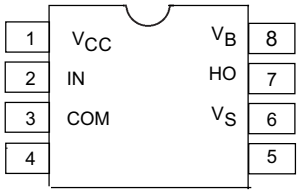
Symbol	Description
V_{CC}	Logic and gate drive supply
IN	Logic input for gate driver output (HO), in phase with HO (IR2117)
$\overline{IN}$	Logic input for gate driver output (HO), out of phase with HO (IR2118)
COM	Logic ground
V_B	High side floating supply
HO	High side gate drive output
V_S	High side floating supply return

Lead Assignments



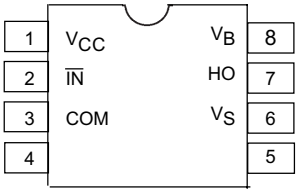
8 Lead PDIP

IR2117



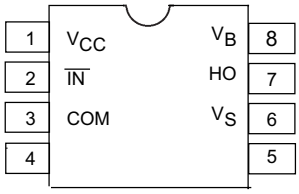
8 Lead SOIC

IR2117S



8 Lead PDIP

IR2118



8 Lead SOIC

IR2118S

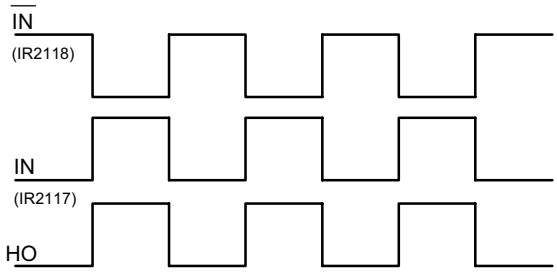


Figure 1. Input/Output Timing Diagram

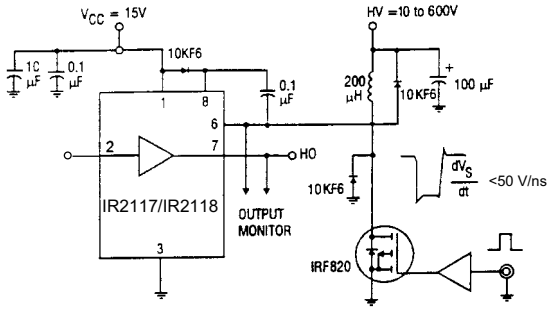


Figure 2. Floating Supply Voltage Transient Test Circuit

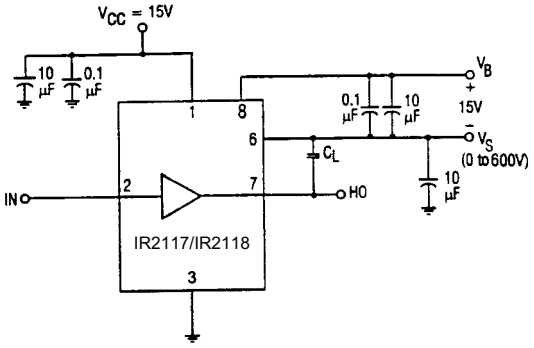


Figure 3. Switching Time Test Circuit

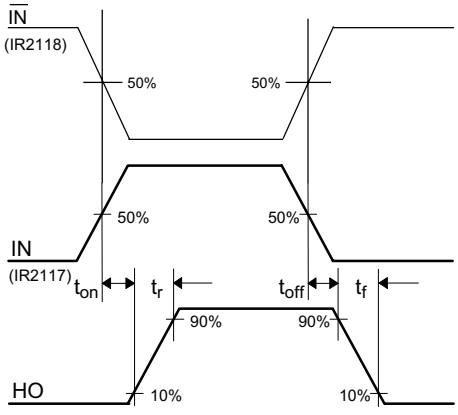


Figure 4. Switching Time Waveform Definition

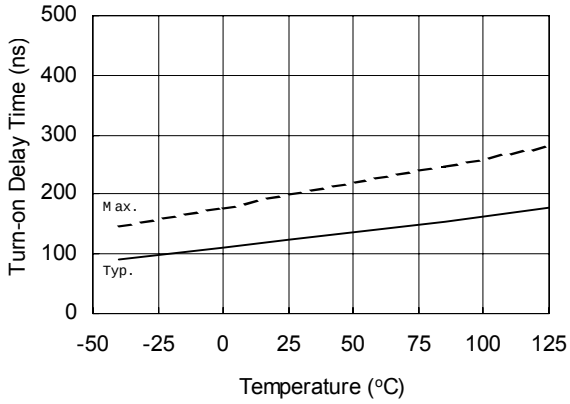


Figure 4A. Turn-On Time vs. Temperature

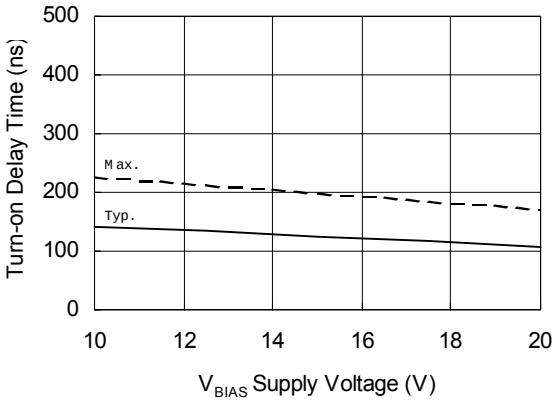


Figure 4B. Turn-On Time vs. Supply Voltage

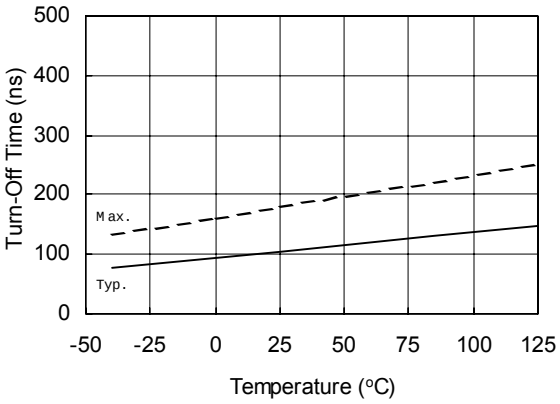


Figure 5A. Turn-Off Time vs. Temperature

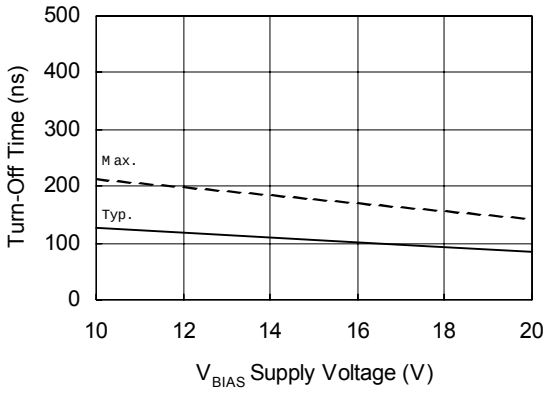
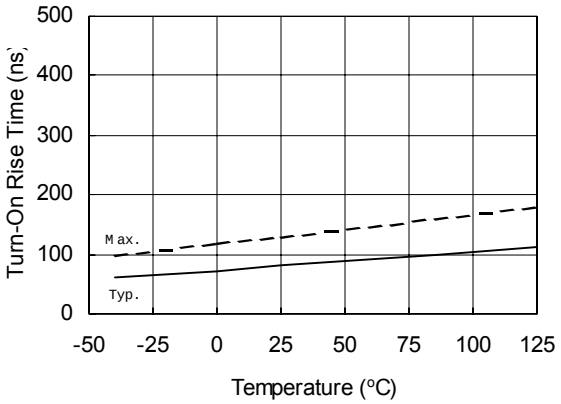


Figure 5B. Turn-Off Time vs. Supply Voltage



Fiure 6A. Turn-On Rise Time vs.Temperature

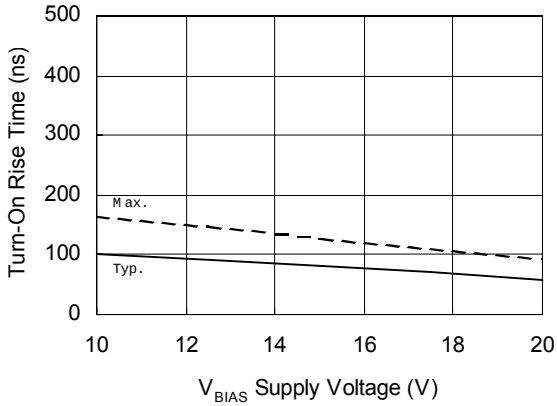


Figure 6B. Turn-On Rise Time vs. Supply Voltage

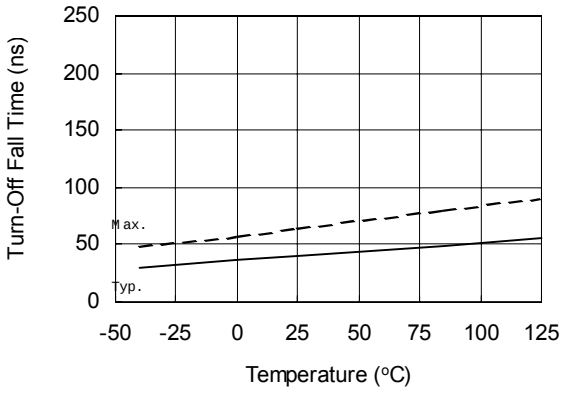


Figure 7A. Turn-Off Fall Time vs. Temperature

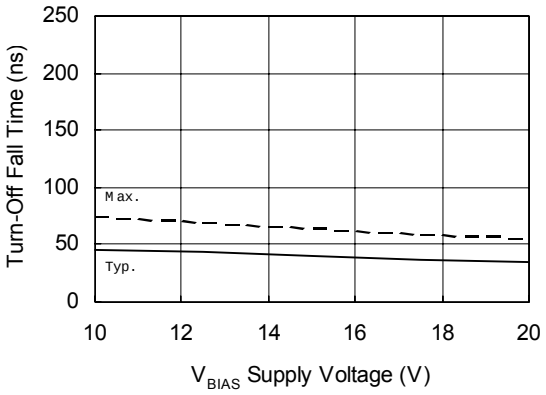


Figure 7B. Turn-Off Fall Time vs. Supply Voltage

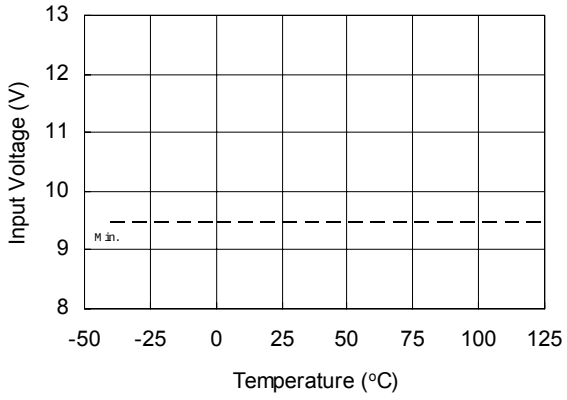


Figure 8A. Logic "1" (IR2118 "0") Input Voltage vs. Temperature

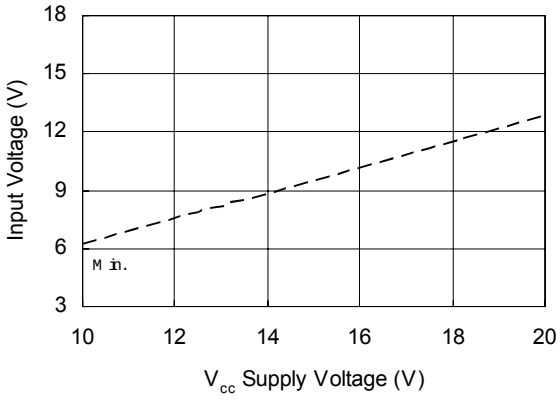


Figure 8B. Logic "1" (IR2118 "0") Input Voltage vs. Supply Voltage

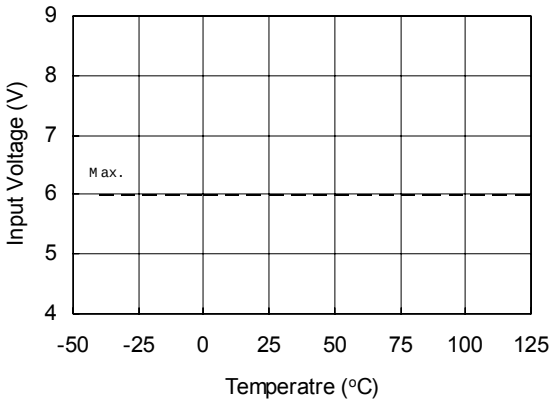


Figure 9A. Logic "0" (IR2118 "1") Input Voltage vs. Temperature

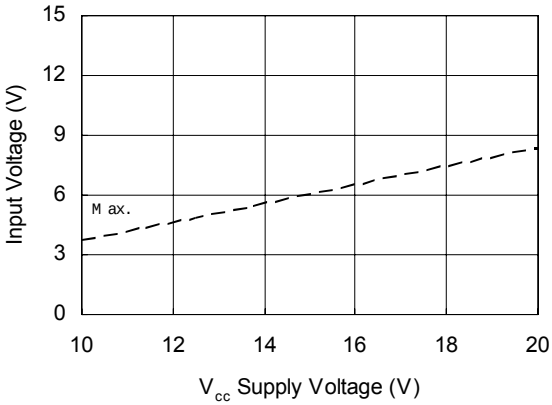


Figure 9B. Logic "0" (IR2118 "1") Input Voltage vs. Supply Voltage

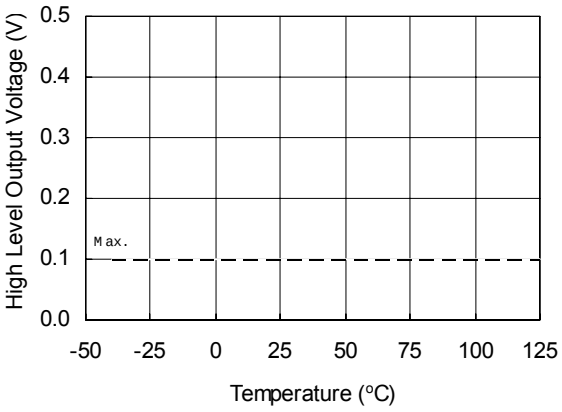


Figure 10A. High Level Output vs. Temperature

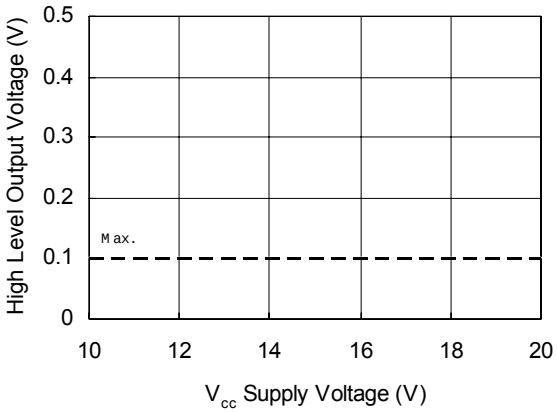


Figure 10B. High Level Output vs. Supply Voltage

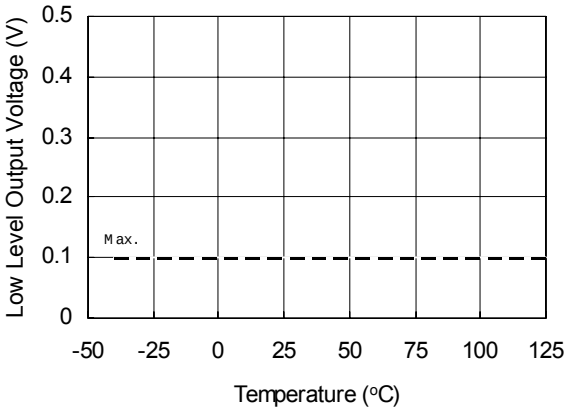


Figure 11A. Low Level Output vs.Temperature

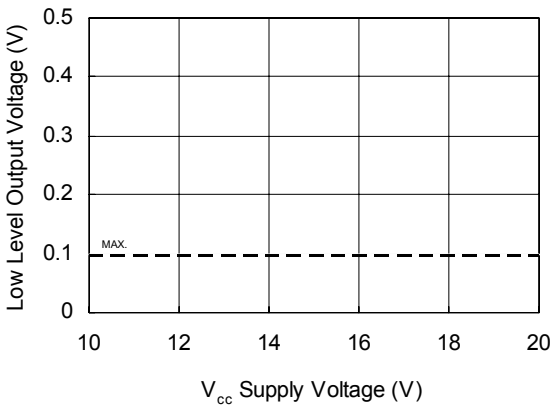


Figure 11B. Low Level Output vs. Supply Voltage

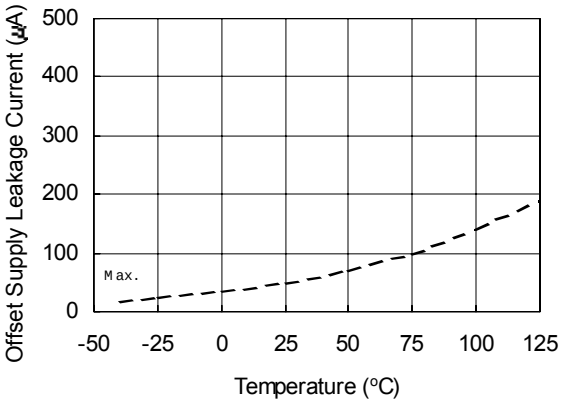


Figure 12A. Offset Supply Leakage Current vs. Temperature

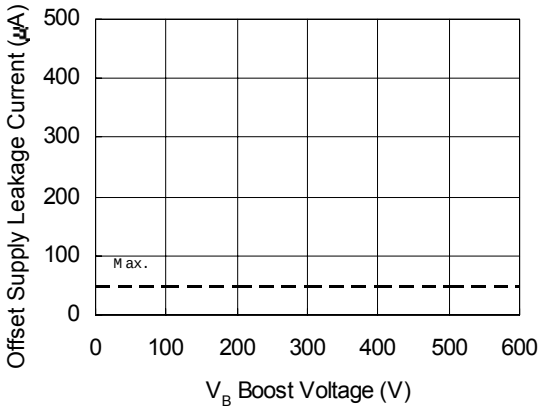


Figure 12B. Offset Supply Leakage Current vs. V_B Boost Voltage

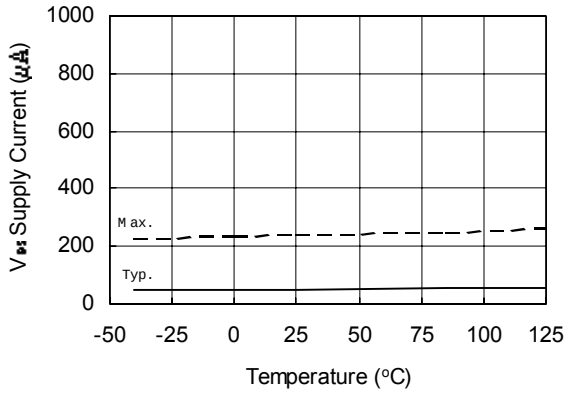


Figure 13A. V_{BS} Supply Current vs. Temperature

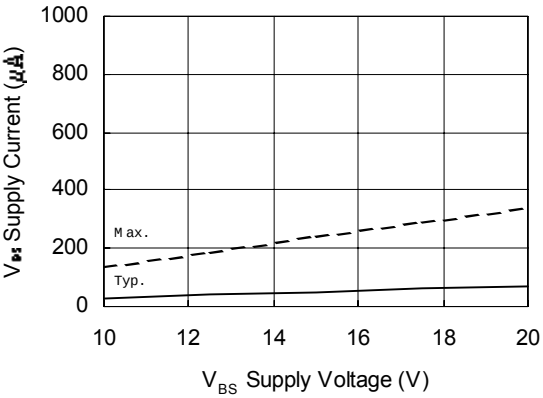


Figure 13B. V_{BS} Supply Current vs. Supply Voltage

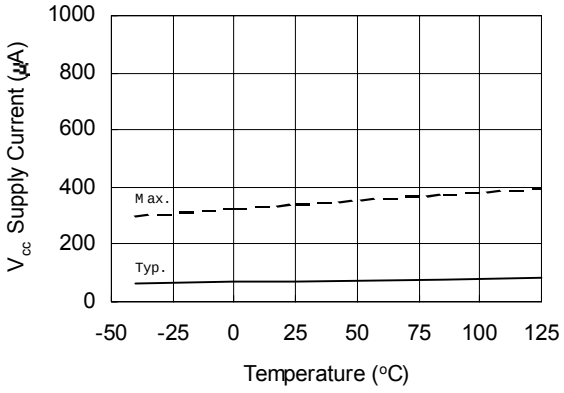


Figure 14A. V_{cc} Supply Current vs. Temperature

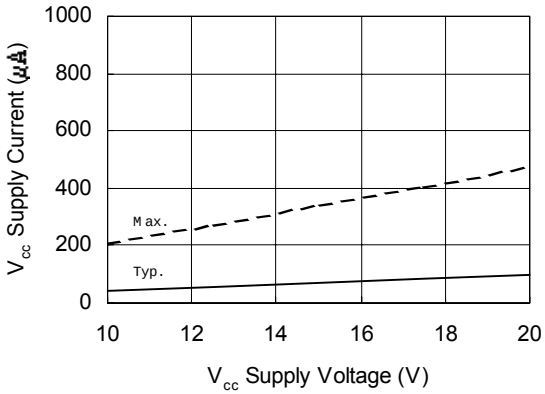


Figure 14B. V_{cc} Supply Current vs. Supply Voltage

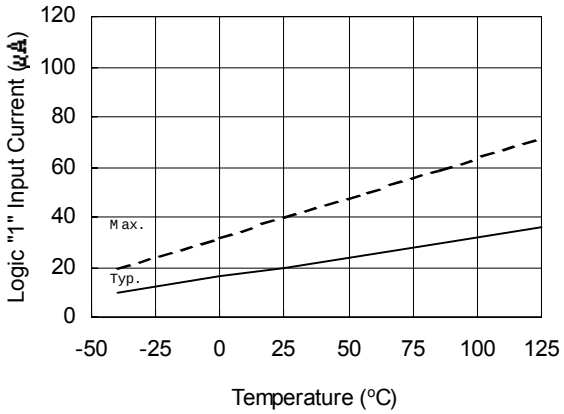


Figure 15A. Logic "1" (2118 "0") Input Current vs. Temperature

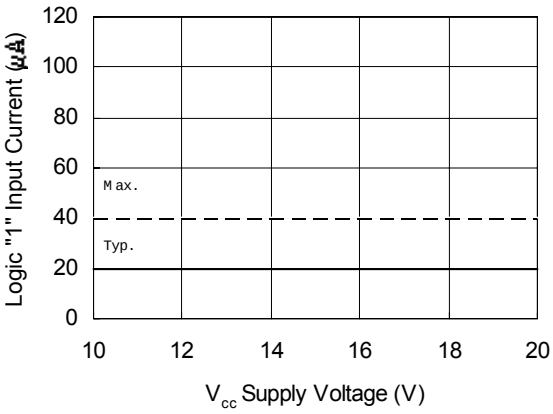


Figure 15B. Logic "1" (2118 "0") Input Current vs. Supply Voltage

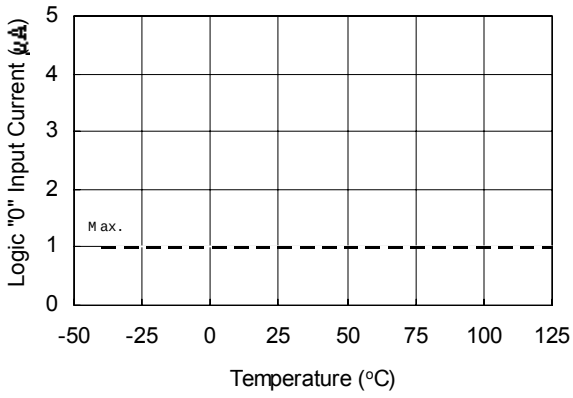


Figure 16A. Logic "0" (2118"1") Input Current vs. Temperature

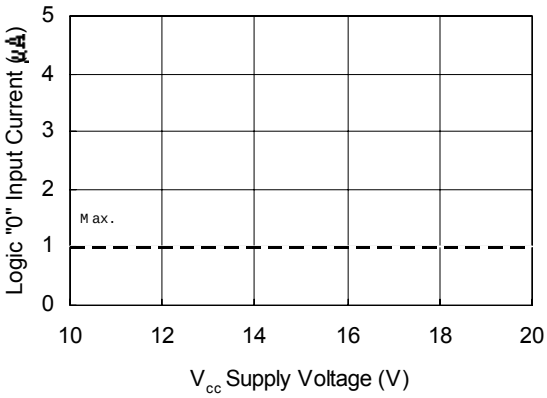


Figure 16B. Logic "0" (2118"1") Input Current vs. Supply Voltage

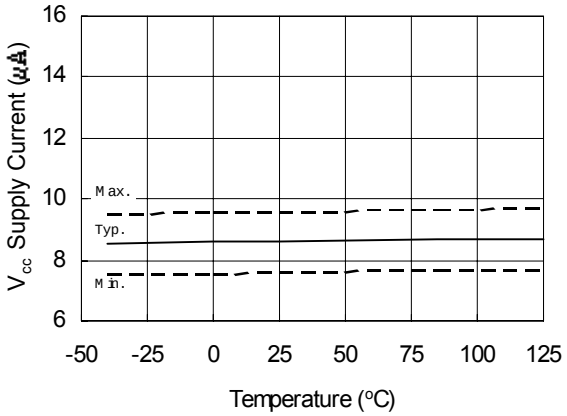


Figure 17A. V_{cc} Undervoltage Threshold (+) vs. Temperature

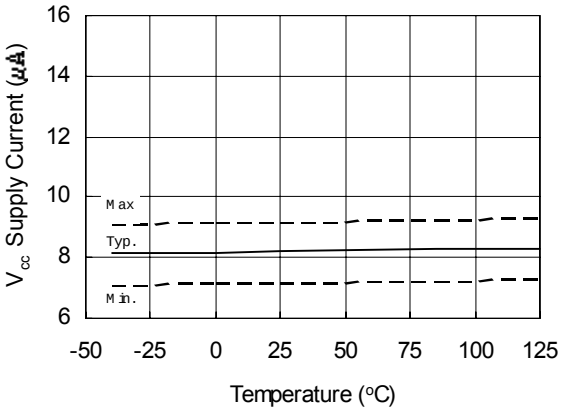


Figure 18A. V_{cc} Undervoltage Threshold (-) vs. Temperature

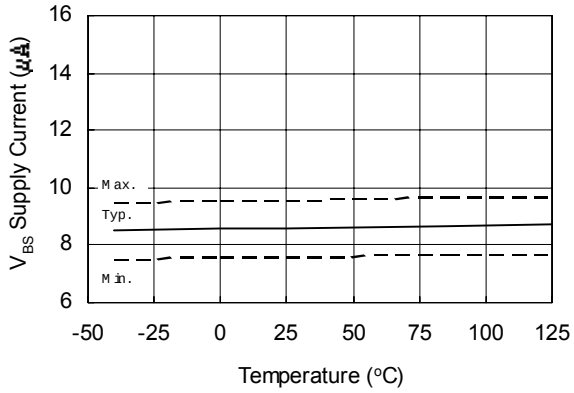


Figure 19A. V_{BS} Undervoltage Threshold (+) vs. Temperature

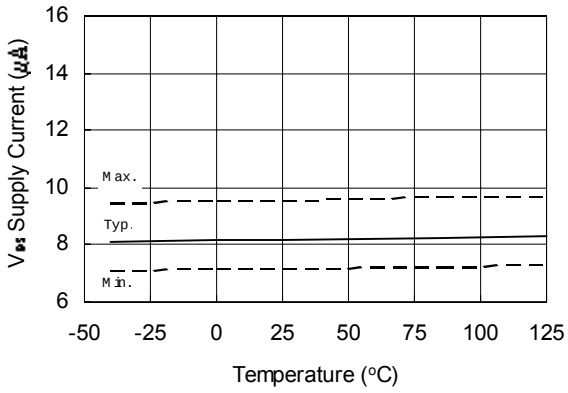


Figure 20A. V_{BS} Undervoltage Threshold (-) vs. Temperature

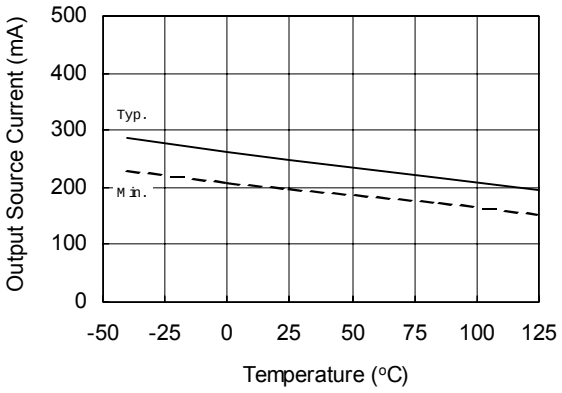


Figure 21A. Output Source Current vs. Temperature

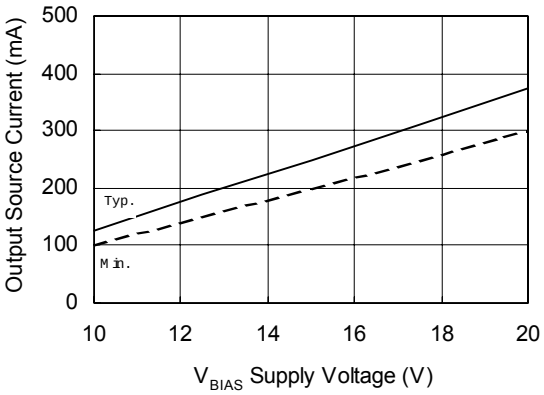


Figure 21B. Output Source Current vs. Supply Voltage

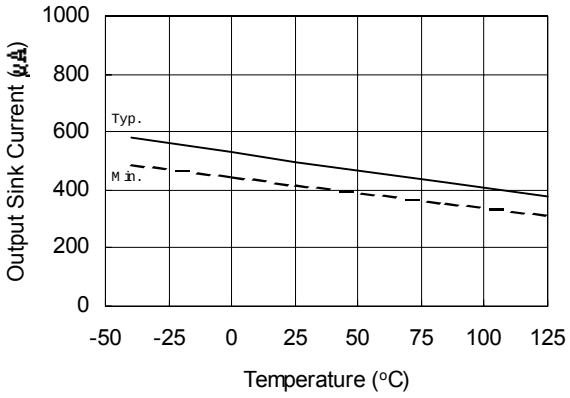


Figure 22A. Output Sink Current vs.Temperature

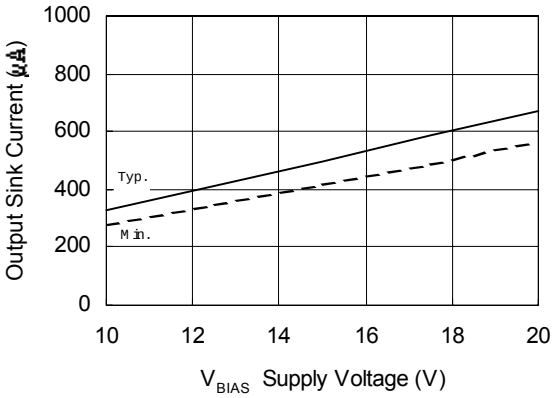


Figure 22B. Output Sink Current vs. Supply Voltage

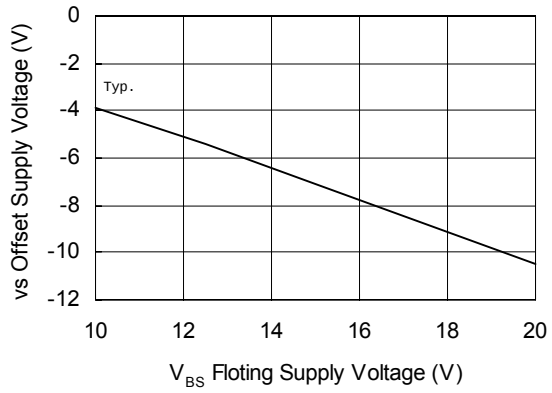


Figure 23B. Maximum VS Negative Offset vs. Supply Voltage

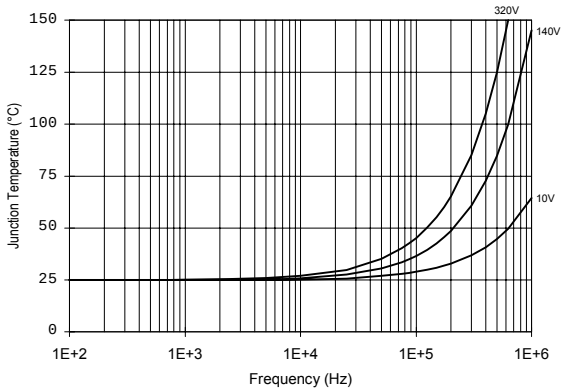


Figure 24. IR2117/IR2118 T_J vs. Frequency (IRFBC20)
R_{GATE} = 33Ω, V_{CC} = 15V

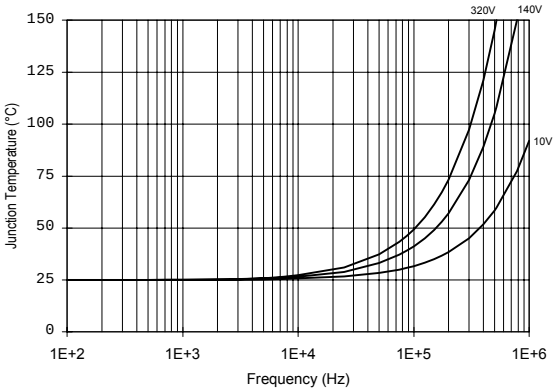


Figure 25. IR2117/IR2118 T_J vs. Frequency (IRFBC30)
R_{GATE} = 22Ω, V_{CC} = 15V

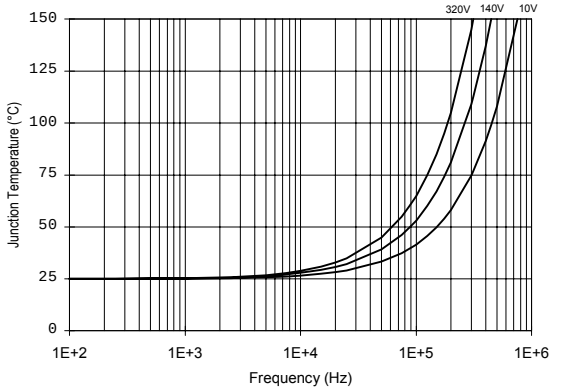


Figure 26. IR2117/IR2118 T_J vs. Frequency (IRFBC40)
R_{GATE} = 15Ω, V_{CC} = 15V

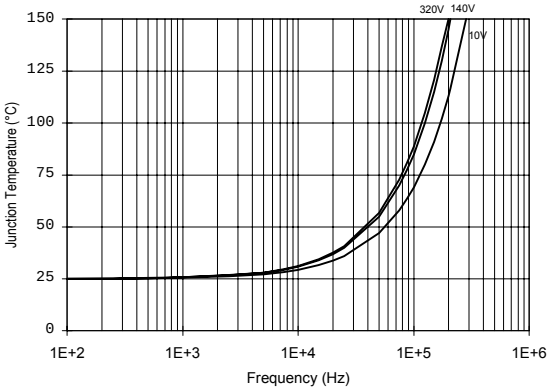
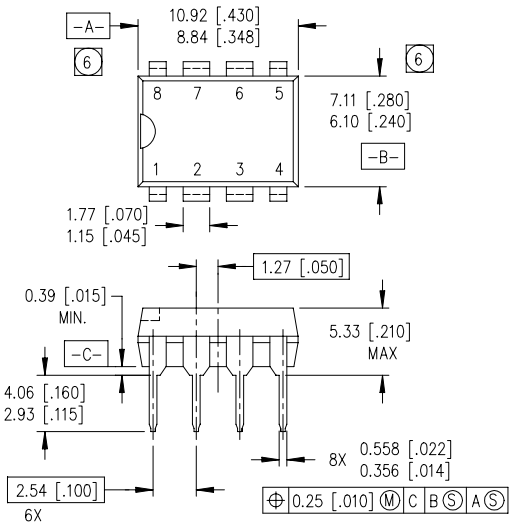
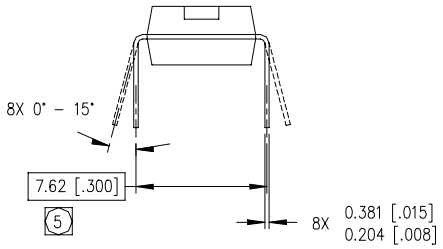


Figure 27. IR2117/IR2118 T_J vs. Frequency (IRFPE50)
R_{GATE} = 10Ω, V_{CC} = 15V

Case outlines

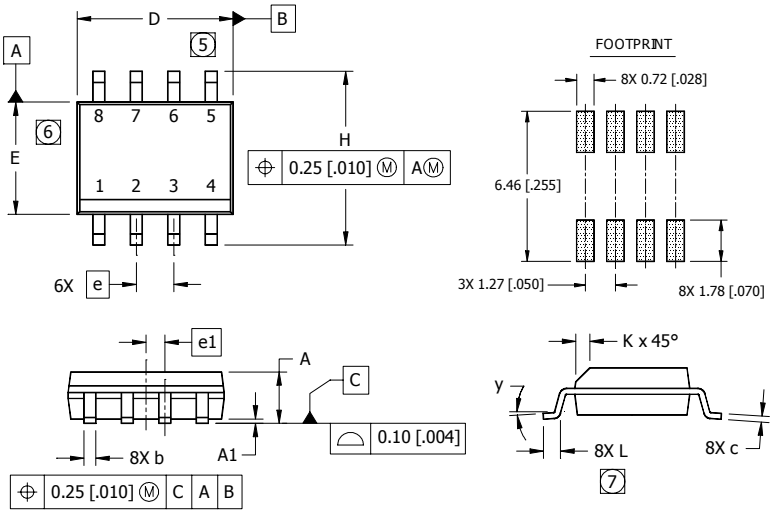


NOTES:
1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M–1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS–001AB.
5. MEASURED WITH THE LEADS CONSTRAINED TO BE PERPENDICULAR TO DATUM PLANE C.
6. DIMENSION DOES NOT INCLUDE MOLD PROTUSIONS.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

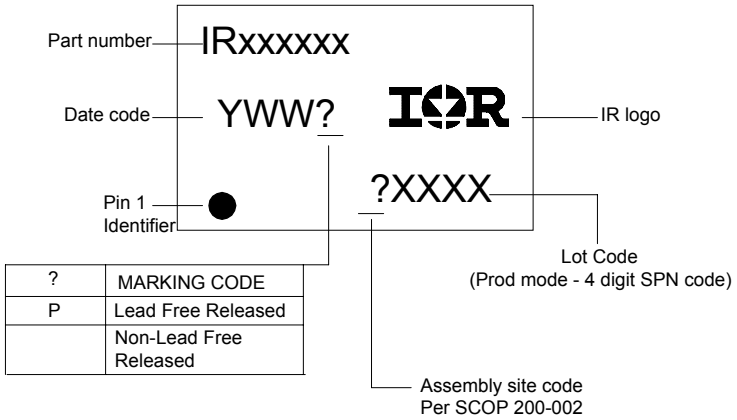
NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

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.

01-6027

8-Lead SOIC

LEADFREE PART MARKING INFORMATION



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

ORDER INFORMATION

Basic Part (Non-Lead Free)
8-Lead PDIP IR2117 order IR2117
8-Lead PDIP IR2118 order IR2118
8-Lead SOIC IR2117S order IR2117S
8-Lead SOIC IR2118S order IR2118S

Leadfree Part
8-Lead PDIP IR2117 order IR2117PbF
8-Lead PDIP IR2118 order IR2118PbF
8-Lead SOIC IR2117S order IR2117SPbF
8-Lead SOIC IR2118S order IR2118SPbF