Application Note AN-1104

IRS2104 and IR2104 Comparison

By Jason Nguyen, Min Fang, David New

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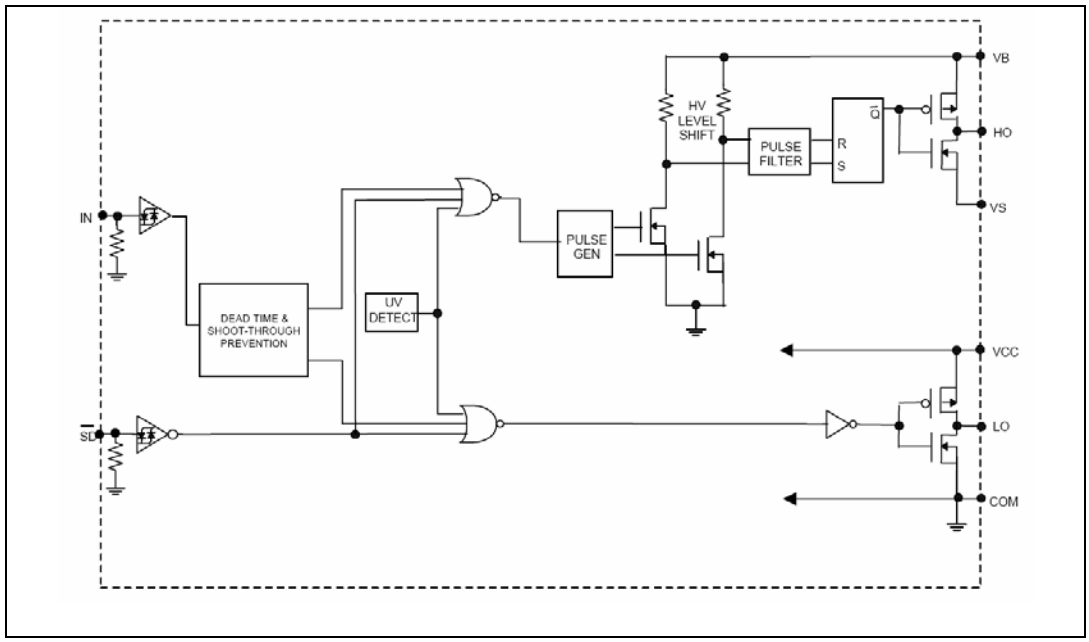
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Introduction

The IRS2104 is a new HVIC product that replaces the IR2104 and is pin-to-pin compatible with its corresponding predecessor. In many cases, little or no change is necessary to use the new product. This application note describes the various differences between the IRS2104 and the IR2104 HVICs.

The IRS2104 is a high voltage, high speed power MOSFET and IGBT driver with independent high 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 outputs, 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 600 V.

Block Diagram



The IRS2104 and the IR2104 share the same block diagram. The functionality of the two ICs is the same.

Electrical Characteristic Differences

All measurement conditions remain unchanged unless noted. Parameters not mentioned in this document have not changed.

Absolute Maximum Ratings

There are no changes in the Absolute Maximum Ratings.

Recommended Operating Conditions

There are no changes in the Recommended Operating Conditions.

Dynamic Electrical Characteristics

Parameter		IR2104		IRS2104		Units
Symbol	Definition	typ	max	typ	max	
t_r	Turn-on rise time	100	170	70	170	ns
t_f	Turn-off fall time	50	90	35	90	

The IRS2104 has faster rise and fall times when compared to the IR2104.

Static Electrical Characteristics

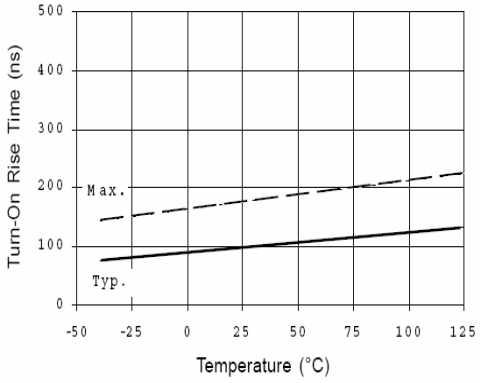
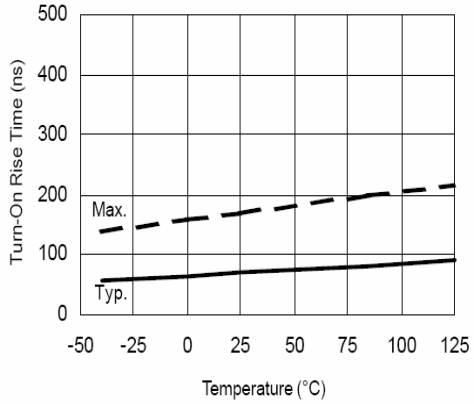
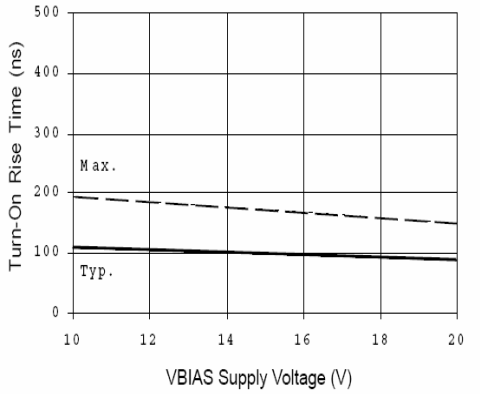
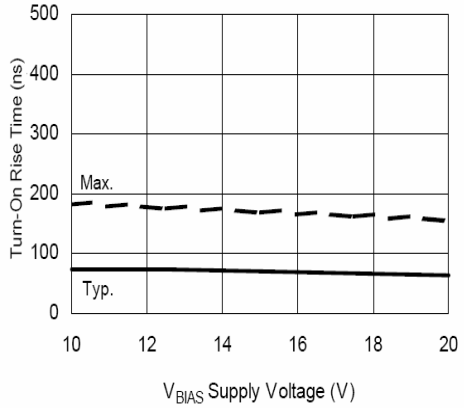
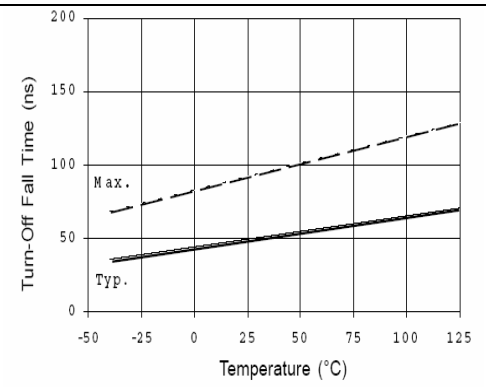
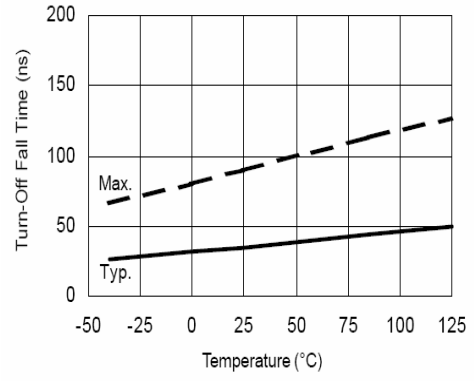
Parameter		IR2104			IRS2104			Units
Symbol	Definition	min	typ	max	min	typ	max	
V_{IH}	Logic "1" input voltage (V_{CC} = 10 V to 20 V)	3	-	-	2.5	-	-	V
V_{IL}	Logic "0" input voltage (V_{CC} = 10 V to 20 V)	-	-	0.8	-	-	0.8	
$V_{SD,TH+}$	SD input positive going threshold	3	-	-	2.5	-	-	
$V_{SD,TH-}$	SD input negative going threshold	-	-	0.8	-	-	0.8	
V_{OH}	High level output voltage, V_{BIAS} - V_O	-	-	0.1	-	0.05	0.2	
		Io = 0 mA			Io = 2 mA			
V_{OL}	Low level output voltage, V_O	-	-	0.1	-	0.02	0.1	
		Io = 0 mA			Io = 2 mA			
I_{O+}	Output high short circuit pulsed current (V_O = 0 V, VIN=Logic "1", PW <= 10us)	130	210	-	130	290	-	mA
I_{O-}	Output low short circuit pulsed current (V_O = 15 V, VIN = Logic "0", PW <= 10us)	270	360	-	270	600	-	

For the IRS2104,

1. The V_{IH} and $V_{SD, TH+}$ are reduced to 2.5 V for better 3.3 V logic compatibility.
2. The V_{OH} and V_{OL} are tested using a new standardized test condition of Io=2 mA. The output driver's on resistance is lower for IRS2104, which improves immunity against the Miller effect.
3. The typical values for I_{O+} and I_{O-} are increased, which allows faster switching.

Figures

This figures shown in this section compare figures shown in the IR2104 (left column) and IRS2104 (right column) datasheets. Illustrations that have not changed between the two datasheets have not been included in this section.

IR2104	IRS2104
	
Figure 9A. Turn-On Rise Time vs Temperature	**Figure 9A. Turn-On Rise Time vs. Temperature**
	
Figure 9B. Turn-On Rise Time vs Voltage	**Figure 9B. Turn-On Rise Time vs. Voltage**
	
Figure 10A. Turn-Off Fall Time vs Temperature	**Figure 10A. Turn-Off Fall Time vs. Temperature**

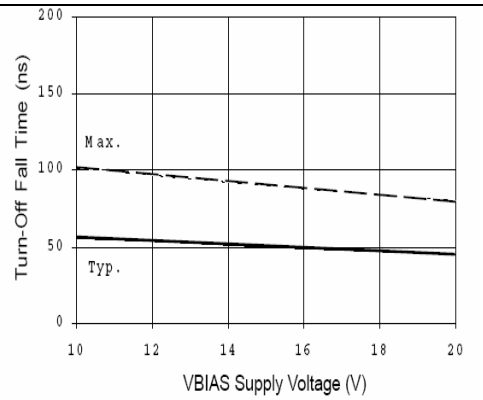


Figure 10B. Turn-Off Fall Time vs Voltage

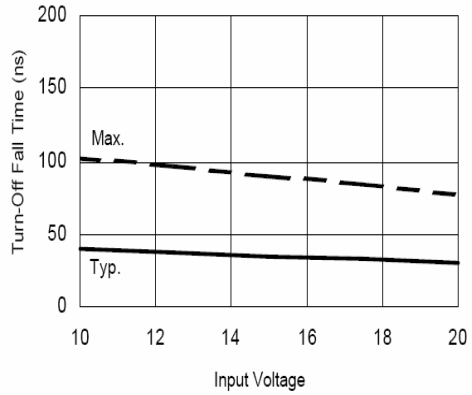


Figure 10B. Turn-Off Fall Time vs. Input Voltage

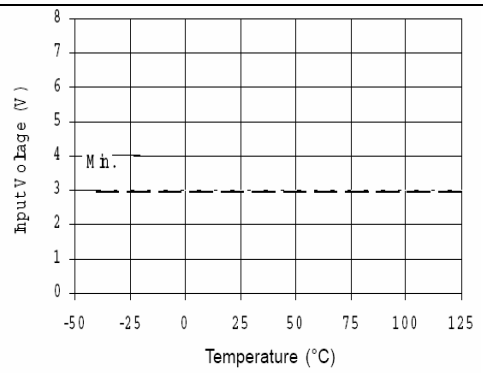


Figure 12A. Logic "1" (HO) & Logic "0" (LO) & Inactive SD Input Voltage vs Temperature

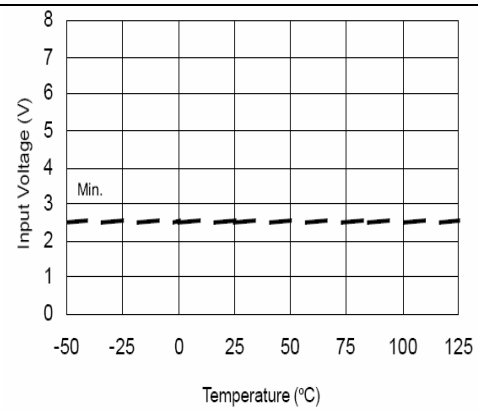


Figure12A. Logic "1" Input Voltage vs. Temperature

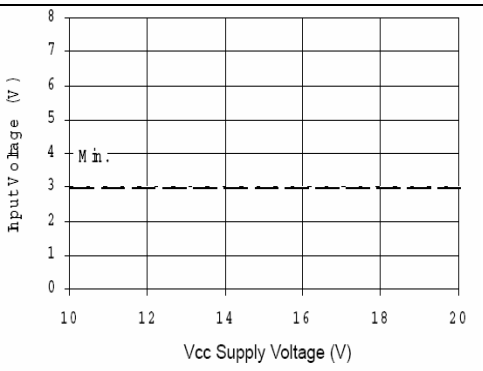


Figure 12B. Logic "1" (HO) & Logic "0" (LO) & Inactive SD Input Voltage vs Voltage

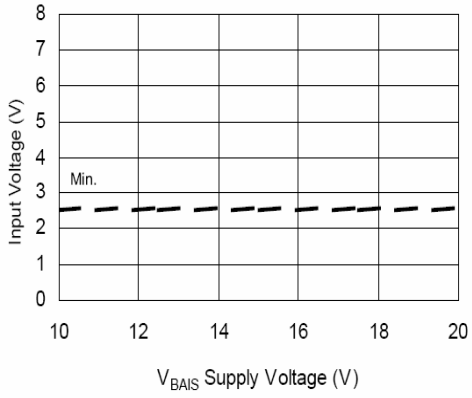


Figure 12B. Logic "1" Input Voltage vs. Supply Voltage

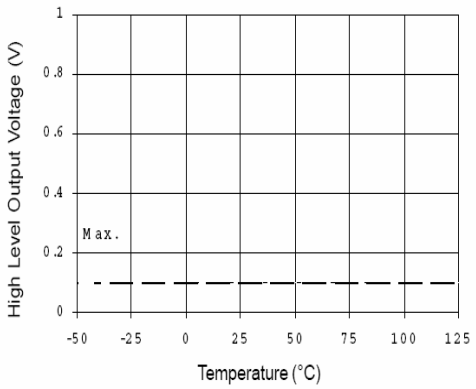


Figure 14A. High Level Output vs Temperature

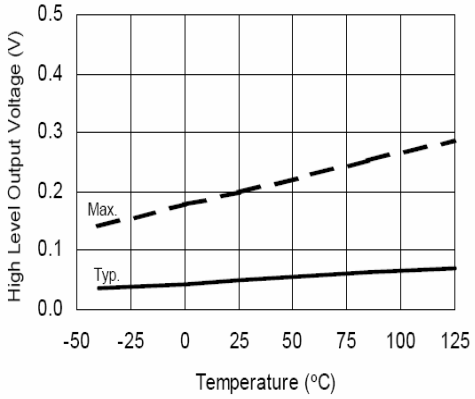


Figure 14A. High Level Output Voltage vs. Temperature

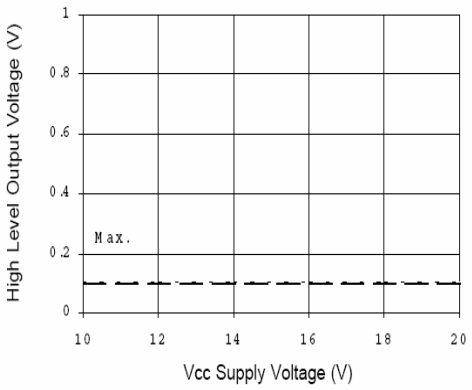


Figure 14B. High Level Output vs Voltage

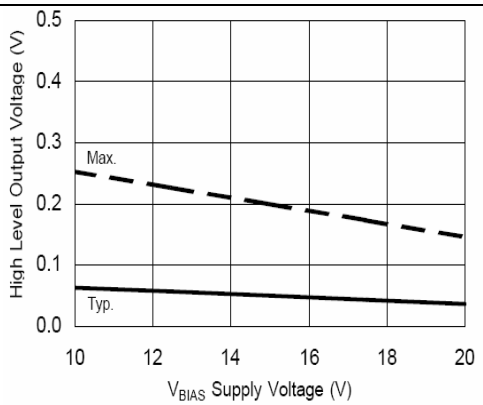


Figure 14B. High Level Output Voltage vs. Supply Voltage

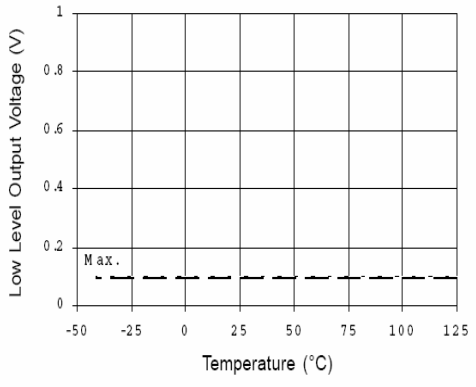


Figure 15A. Low Level Output vs Temperature

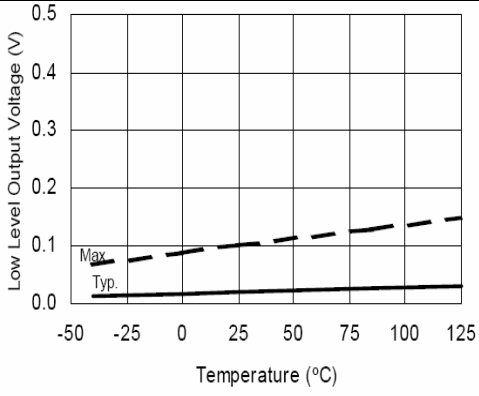


Figure 15A. Low Level Output Voltage vs. Temperature

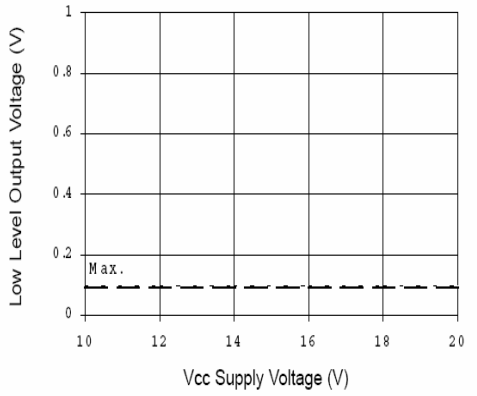


Figure 15B. Low level Output vs Voltage

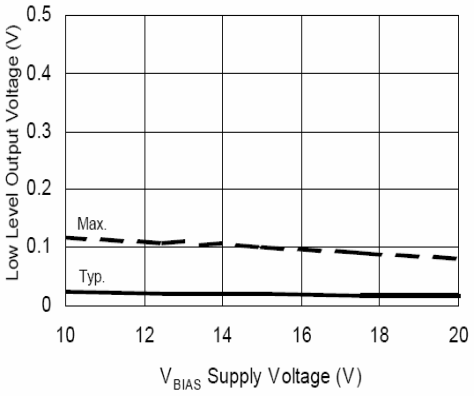


Figure 15B. Low Level Output Voltage vs. Supply Voltage

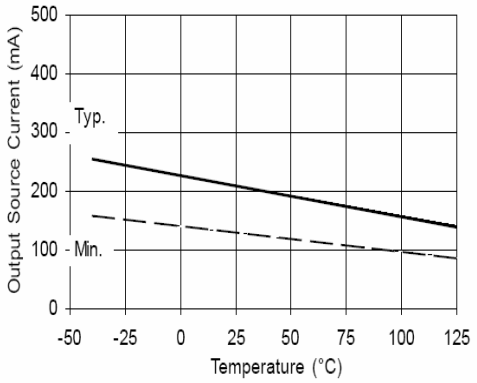


Figure 22A. Output Source Current vs Temperature

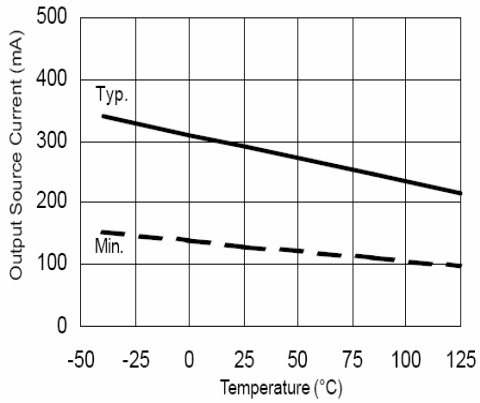


Figure 22A. Output Source Current vs. Temperature

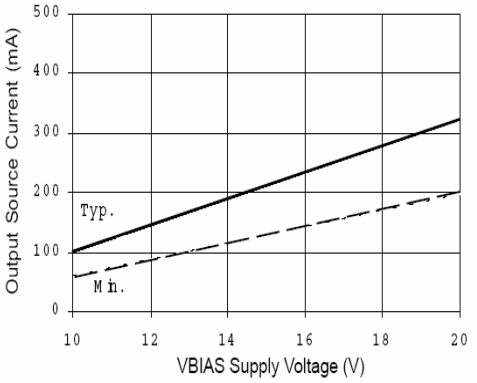


Figure 22B. Output Source Current vs Voltage

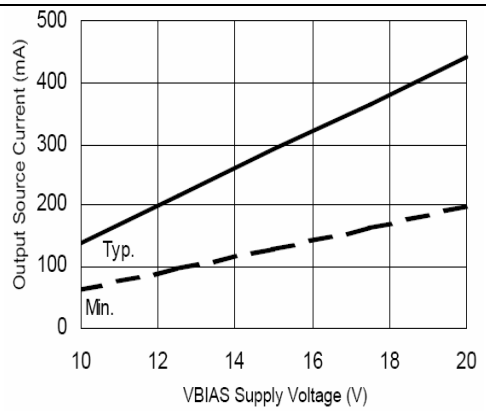


Figure 22B. Output Source Current vs. Voltage

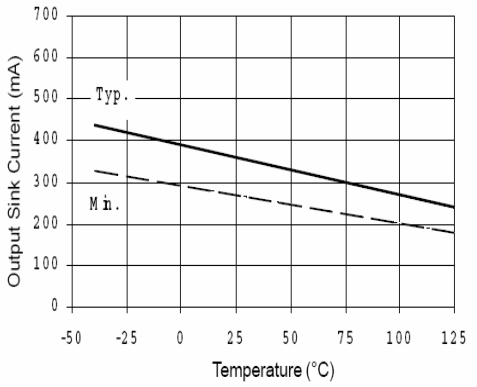


Figure 23A. Output Sink Current vs Temperature

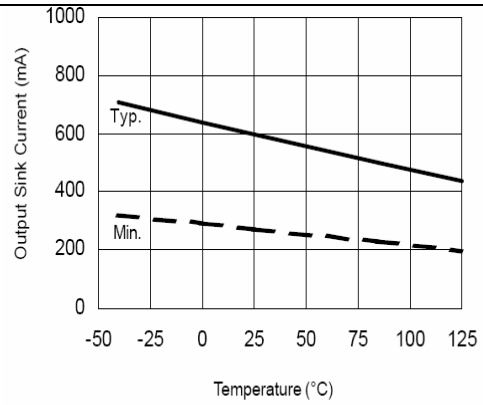


Figure 23A. Output Sink Current vs. Temperature

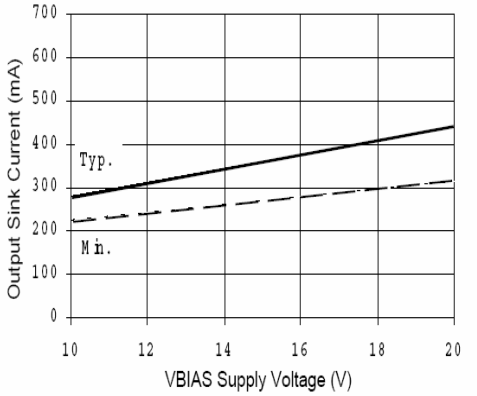


Figure 23B. Output Sink Current vs Voltage

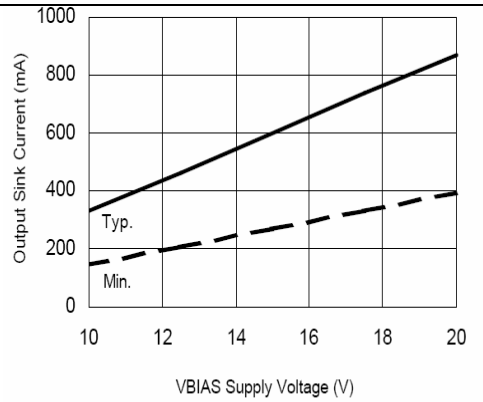


Figure 23B. Output Sink Current vs. Supply Voltage

Summary

As shown by this document, the IRS2104 and the IR2104 are very similar with only a few negligible parametric differences.