



XRP2527 / 2528

Single / Dual Channel Adjustable Current Power Distribution Switch

May 2011

Rev. 1.0.0

GENERAL DESCRIPTION

The Exar XRP2527/XRP2528 Evaluation board (EVB) is a full assembled and tested surface-mount PCB that demonstrates the XRP2527 (single-channel) and XRP2528 (dual-channel) integrated high-side power distribution switches.

Current limit thresholds of XRP2527 and XRP2528 can be programmed accurately and independently for each channel via an external resistor. A simple setting optimizes these devices for use in USB 2.0 or 3.0 compliant V_{BUS} power distribution architectures. They can be used in any self or bus powered USB applications.

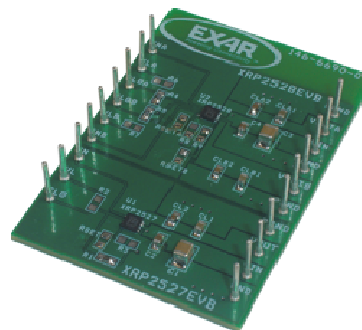
XRP2527 and XRP2528 are offered in RoHS compliant "green"/halogen free 3mm x 3mm 8-pin and 10-pin TDFN packages respectively.

STANDARD CONFIGURATION

The XRP2527/2528EVB is configured to operate under the following conditions:

Input voltage range V_{IN} : 1.8V – 5.5V
Current Limit Threshold setting: RSET = 100k Ω

EVALUATION BOARD MANUAL



FEATURES

- **Single / Dual Channel Current Switch**
 - 1A per channel capable
 - 1.8V to 5.5V Input Voltage Range
- **Programmable Over-Current Limit**
 - 300mA to 1A set via external resistor
 - $\pm 8\%$ threshold accuracy at 1A
- **USB 2.0 / 3.0 Compliant**
- **Individual Channel Enable & Fault Flag Indicator**
- **UVLO, Reverse Current & Thermal Shutdown Protection**

EVALUATION BOARD SCHEMATICS

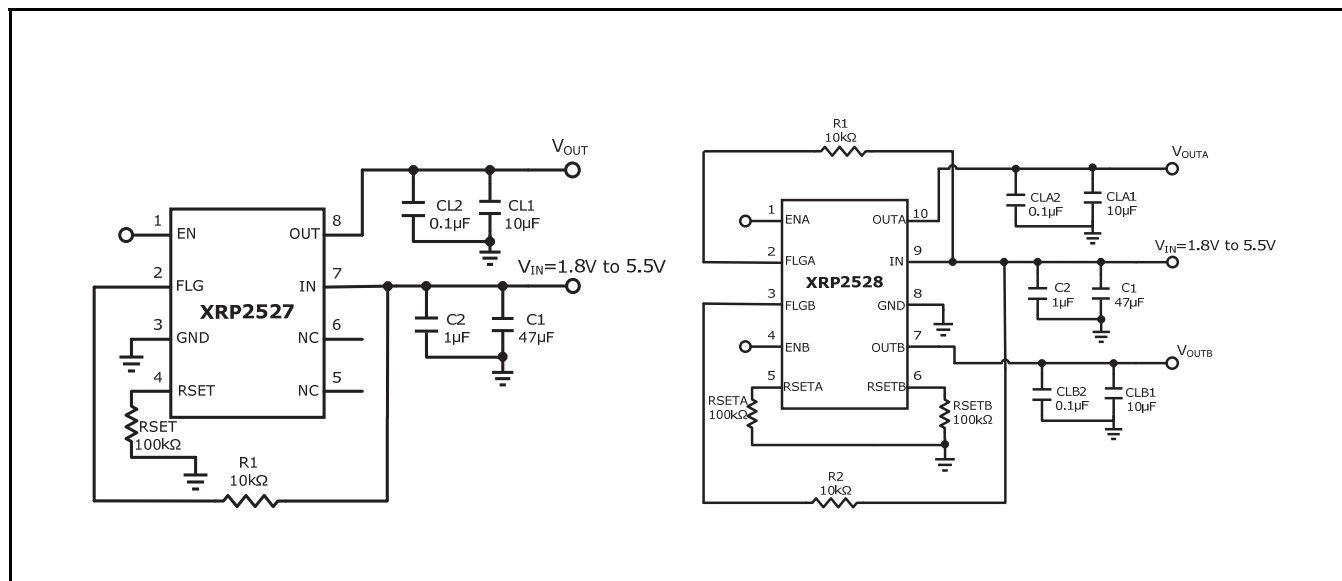


Fig. 1: XRP2527/2528 Evaluation Board Schematics

PIN ASSIGNMENT

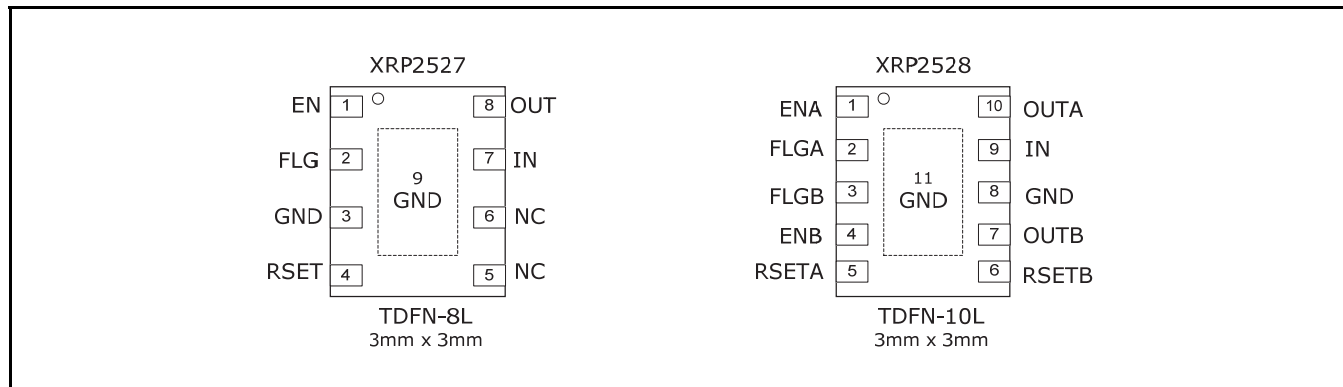


Fig. 2: XRP2527/2528 Pin Assignment

PIN DESCRIPTION – XRP2527

Name	Pin Number	Description
EN	1	Channel Enable Input
FLG	2	Error Flag Signal Active low open drain output. Active on over-current, over-temperature or UVLO conditions.
GND	3	Ground Signal
NC	5,6	No Connect
IN	7	Voltage Input Pin
OUT	8	Voltage Output Pin
RSET	4	Current Limiting Threshold setting RSET tied to IN: USB 3.0 current limit settings RSET floating: USB 2.0 current limit settings RSET tied to GND via resistor R: Adjustable current limit

PIN DESCRIPTION – XRP2528

Name	Pin Number	Description
EN _x	1,4	Channel Enable Input
FLG _x	2,3	Error Flag Signal Active low open drain output. Active on over-current, over-temperature or UVLO conditions.
GND	8	Ground Signal
IN	9	Voltage Input Pin
OUT _x	7,10	Voltage Output Pin
RSET _x	5,6	Current Limiting Threshold setting RSET tied to IN: USB 3.0 current limit settings RSET floating: USB 2.0 current limit settings RSET tied to GND via resistor R: Adjustable current limit

ORDERING INFORMATION

Refer to XRP2527/2528's datasheet and/or www.exar.com for exact and up to date ordering information.



XRP2527 / 2528

Single / Dual Channel Adjustable Current Power Distribution Switch

USING THE EVALUATION BOARD

INITIAL SETUP

The Board is supplied from EXAR with the XRP2527 and XRP2528 devices. Set the input supply to a voltage between 1.8V to 5.5V and connect it to VIN1/VIN2 and GND connectors on the right side of the evaluation board.

Enable pin must be pulled up HIGH to enable the IC. Connect the load to the VOUT and PGND connectors on the right hand side of the board.

Flag pin is pulled up to VIN1/VIN2 through a 10kΩ resistor (provided by default on the board) or can instead be connected to a separate external power supply voltage VL/VL1/VL2.

The board will power-up upon turning on the input supply and reach the desired output voltage. The board can operate with a load current I_{OUT} of up to 900mA per channel.

Current Limit Operation

The current limit threshold can be programmed from 300mA to 1A set via an external resistor at the RSET pin. Its value is set using the RSET resistor by the following equation:

$$I_{LIM} \text{ typ. [A]} = \frac{108.7}{RSET[\text{kohm}]}$$

Please note that the allowed values for RSET resistor are $100\text{kohm} < RSET < 330\text{kohm}$.

By default, XRP2527/28EVB comes with the RSET pin tied to GND through 100kΩ resistor. The device can be set to USB 3.0 current limit setting when the RSET pin is floating. For USB 2.0 current limit setting, the RSET pin must be tied to VIN. A current limit function will signal the Error Flag.

TYPICAL PERFORMANCE CHARACTERISTICS

All data taken at $V_{IN} = 5V$, $C_{IN} = 47\mu F / 1\mu F$, $C_{OUT} = 10\mu F$, $T_J = T_A = 25^\circ C$, unless otherwise specified - Schematic and BOM from Application Information section of this datasheet.

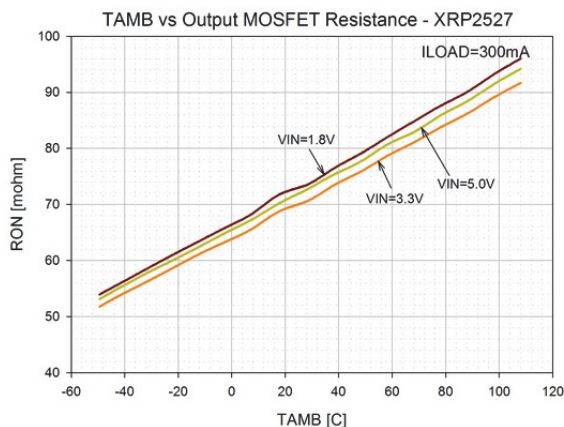


Fig. 3: Output On-Resistance vs. Temperature (XRP2527)

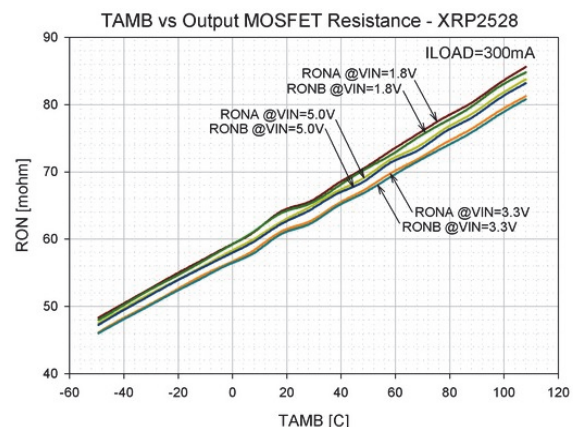


Fig. 4: Output On-Resistance vs. Temperature (XRP2528)

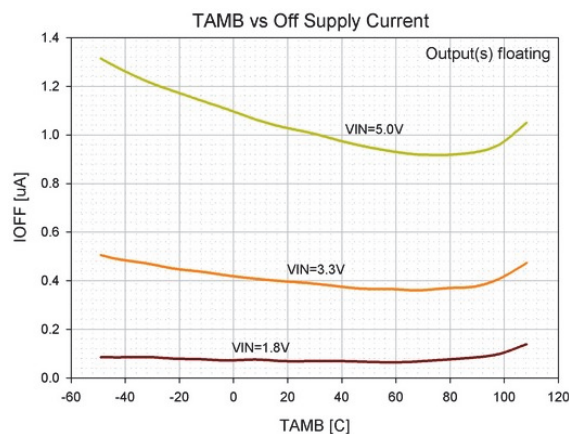


Fig. 5: Off Supply Current vs. Temperature

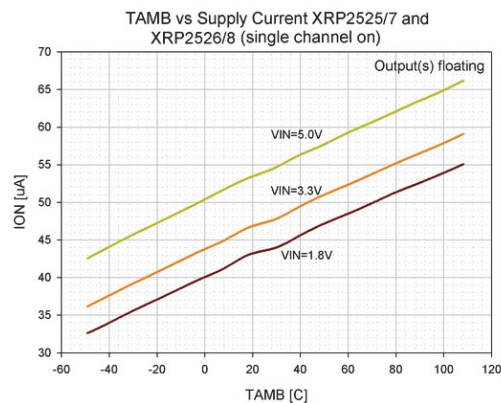


Fig. 6: Quiescent Current vs. Temperature XRP2527 and XRP2528 (1-channel on)

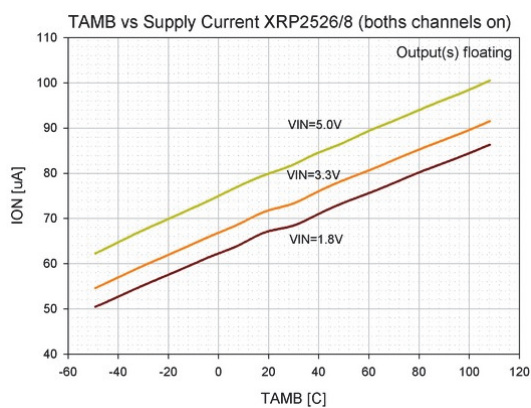


Fig. 7: Quiescent Current vs. Temperature XRP2528 (2-channels on)

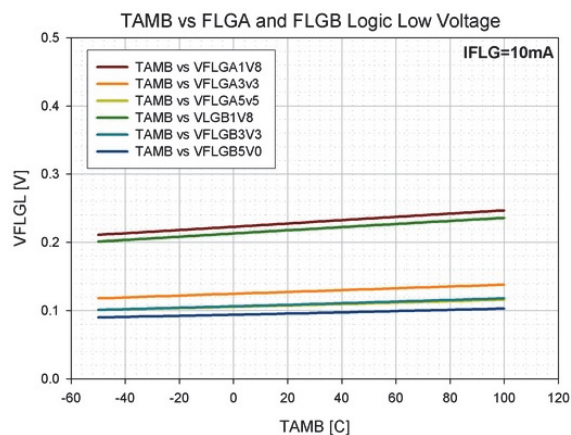


Fig. 8: FLG Logic Low Voltage vs. Temperature

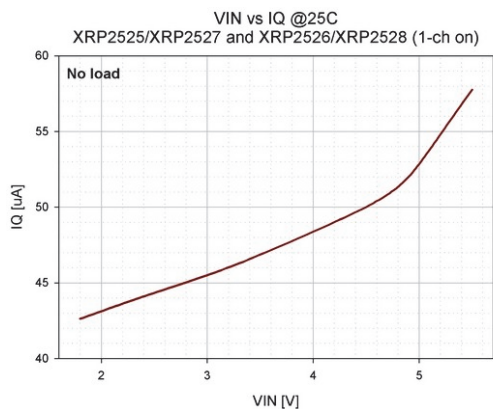


Fig. 9: Quiescent Current vs. Input Voltage XRP2527 and XRP2528 (1-channel on)

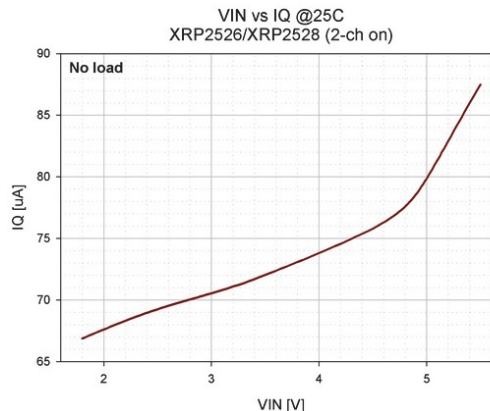


Fig. 10: Quiescent Current vs. Input Voltage XRP2528 (2-channels on)

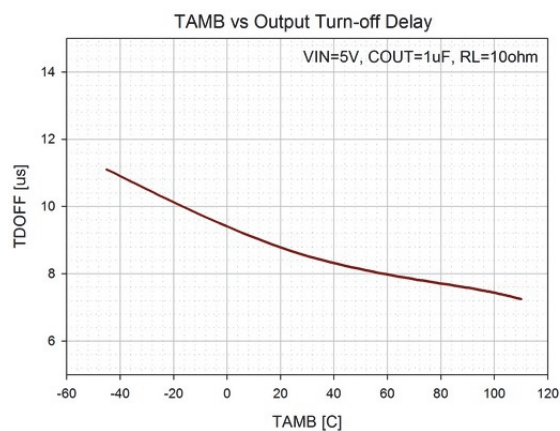


Fig. 11: Output Turn-Off Delay vs. Temperature

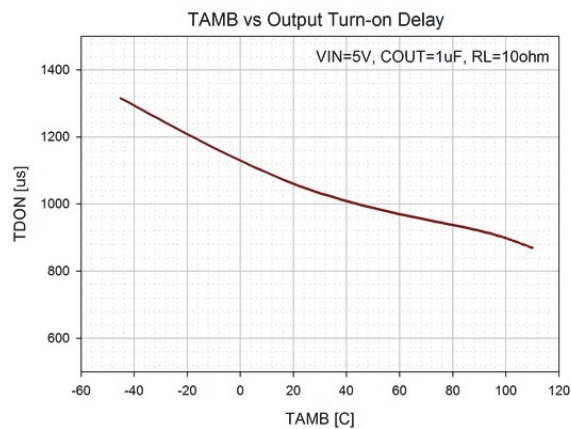


Fig. 12: Output Turn-on Delay vs. Temperature

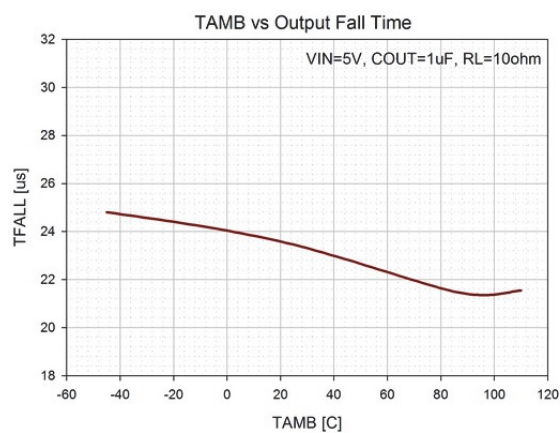


Fig. 13: Output Fall Time vs. Temperature

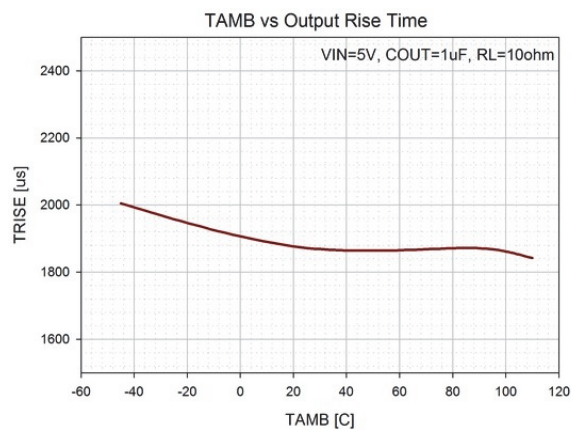


Fig. 14: Output Rise Time vs. Temperature

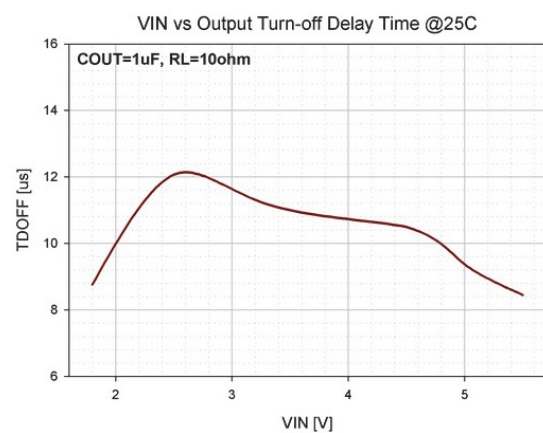


Fig. 15: Output Turn-Off Delay Time vs. Input Voltage

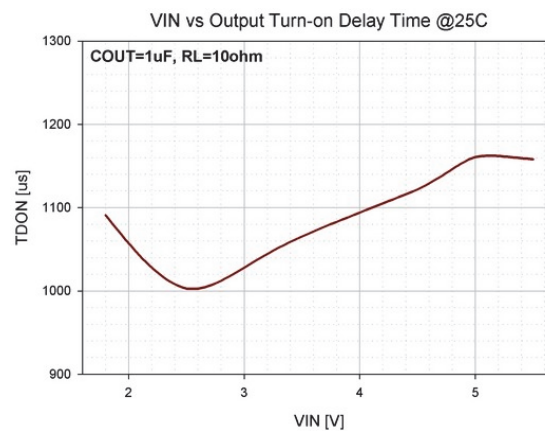


Fig. 16: Output Turn-On Delay Time vs. Input Voltage

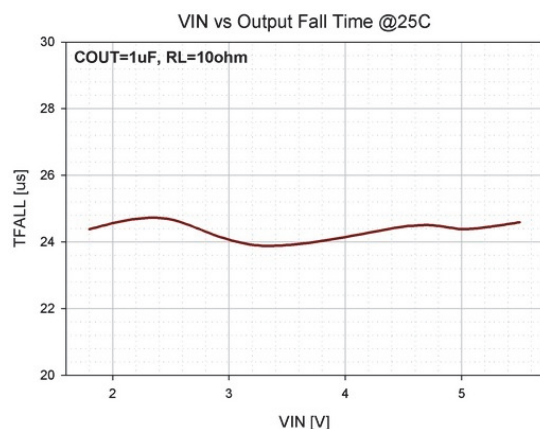


Fig. 17: Output Fall Time vs. Input Voltage

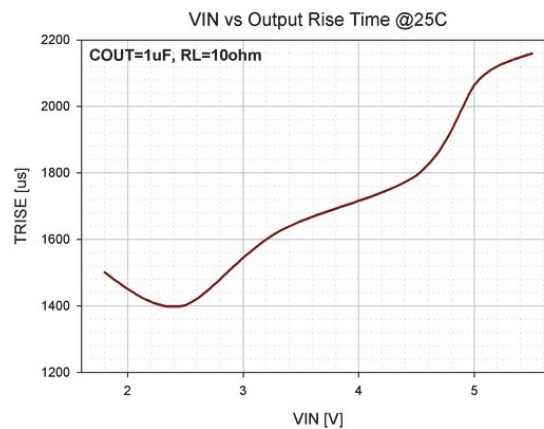


Fig. 18: Output Rise Time vs. Input Voltage

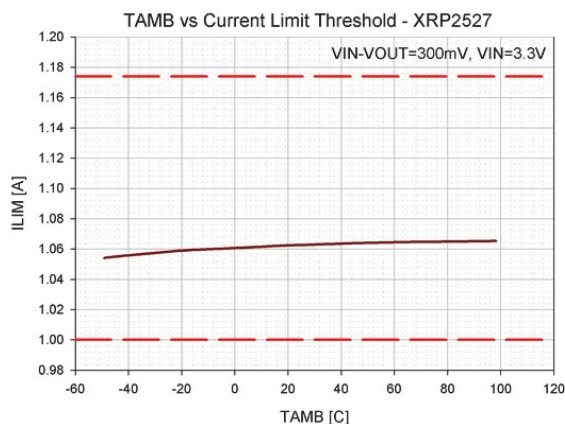


Fig. 19: Current Limit Threshold vs. Temperature (XRP2527)

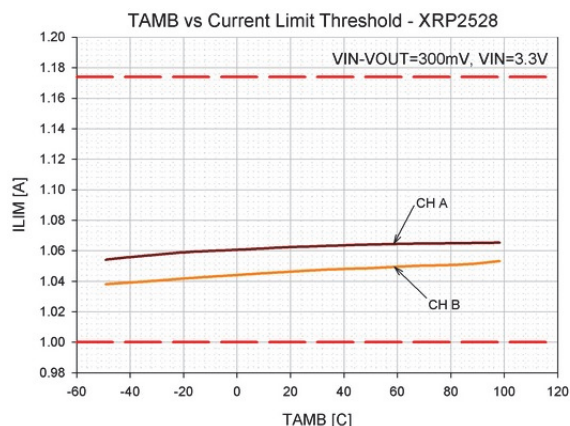


Fig. 20: Current Limit Threshold vs. Temperature (XRP2528)

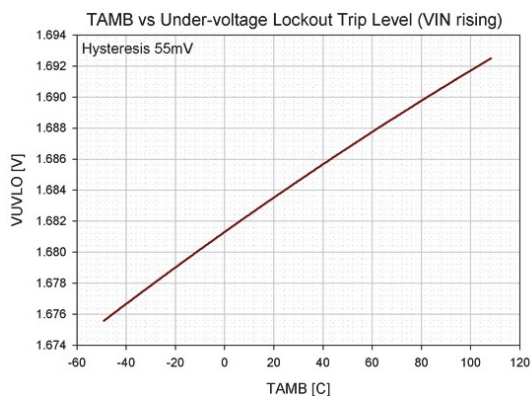


Fig. 21: Under-voltage lockout trip level vs. Temperature (VIN Rising)

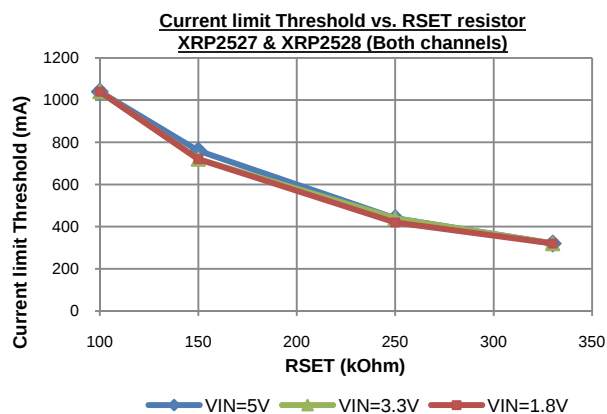


Fig. 22: Current Limit Threshold vs. RSET resistor value

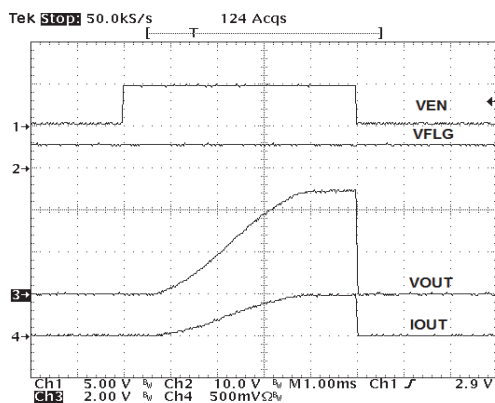


Fig. 23: Turn-On, Turn-Off Characteristics (XRP2528):
COUT = 1uF, Rload = 10Ω, RSET floating

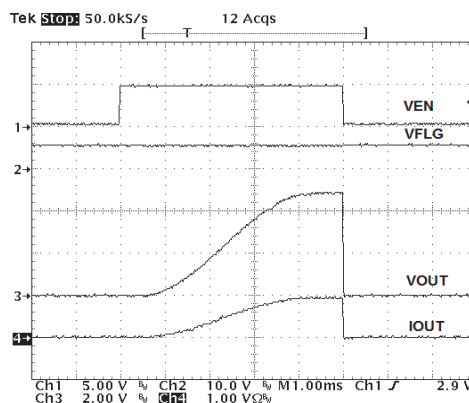


Fig. 24: Turn-On, Turn-Off Characteristics (XRP2528):
COUT = 1uF, Rload = 5Ω, RSET floating

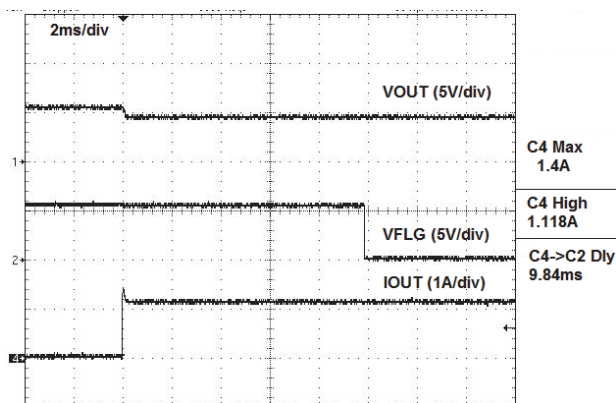


Fig. 25: Current Limit Operation (XRP2527):
VIN=5.5V, Rload = 3.9Ω, USB3.0

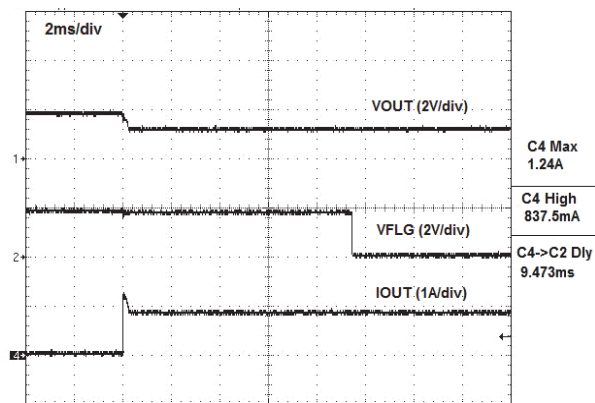


Fig. 26: Current Limit Operation (XRP2528):
VIN=1.8V, Rload = 1.5Ω, USB2.0

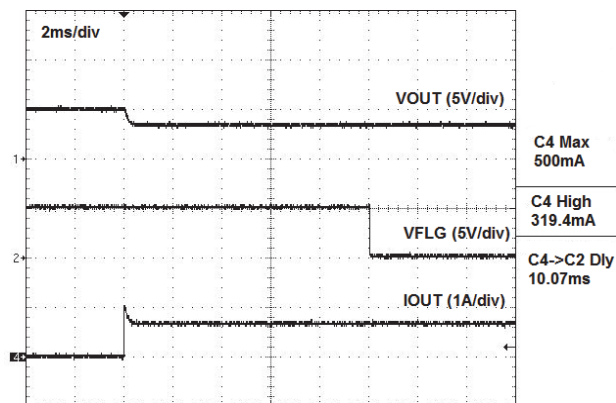
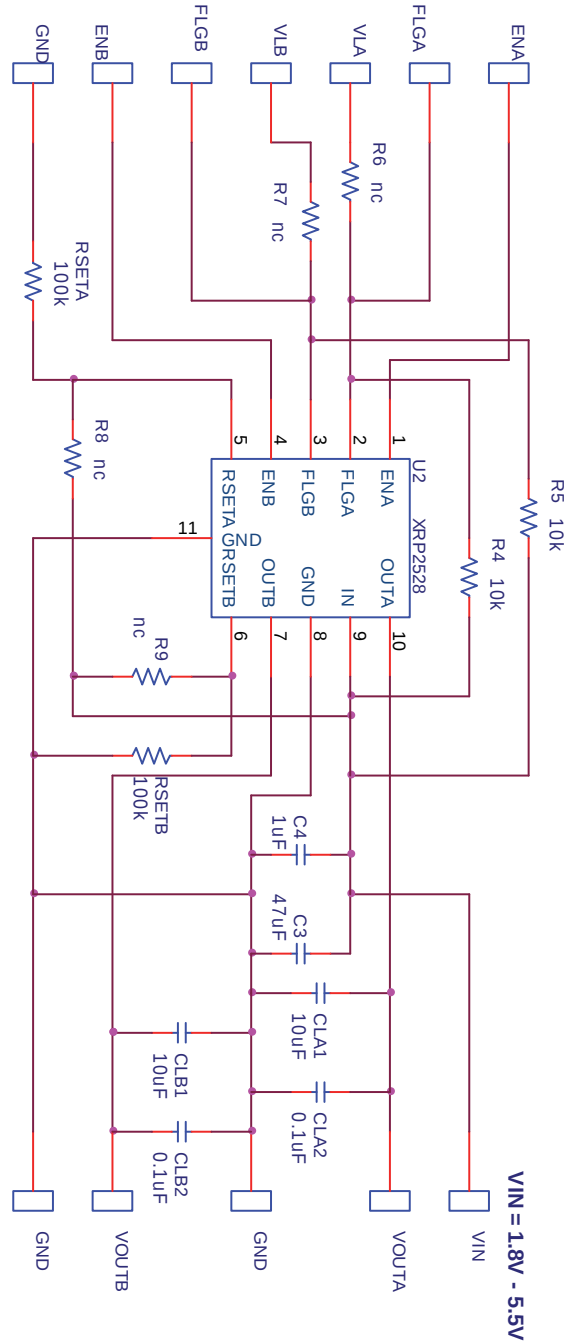
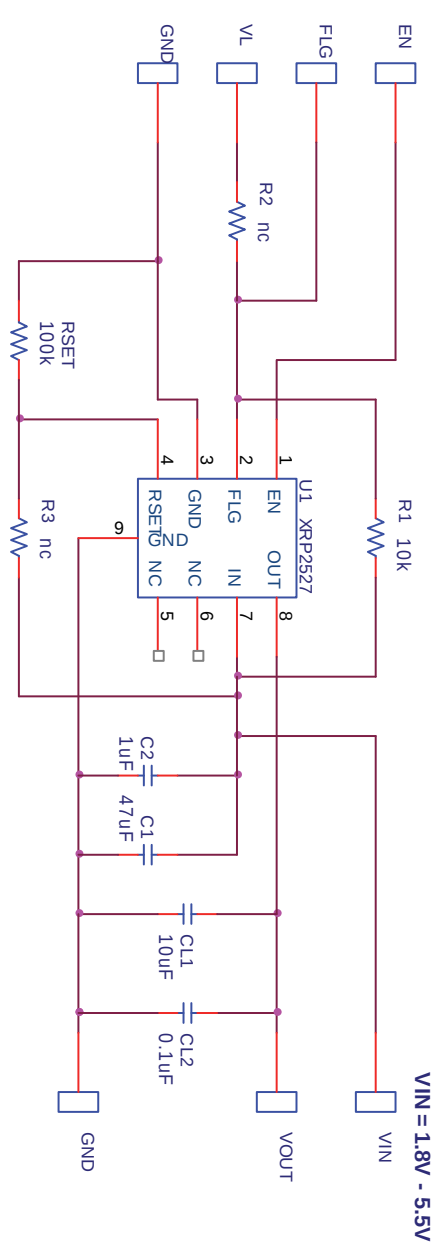


Fig. 27: Current Limit Operation (XRP2527):
VIN=5V, Rload = 10Ω, RSET = 330kΩ

EVALUATION BOARD SCHEMATICS





XRP2527 / 2528

Single / Dual Channel Adjustable Current Power Distribution Switch

BILL OF MATERIAL

Ref.	Qty	Manufacturer	Part Number	Size	Component
EVAL BD	1	Exar Corp.	146-6690-01		XRP2527/28 Evaluation Board
U1	1	Exar Corp.	XRP2527IHB	TDFN 8-pin	XRP2527
U2	1	Exar Corp.	XRP2528IHB	TDFN 10-pin	XRP2528
C1, C3	2	Murata Corp.	GRM32ER61C476KE15L	1210	Ceramic 47uF, 16V, X5R
CL1, CLA1, CLB1	3	Murata Corp.	GRM21BR61C106KE15L	0805	Ceramic 10uF, 16V, X5R
CL2, CLA2, CLB2	3	Murata Corp.	GRM188R71H104KA93D	0603	Ceramic 0.1uF, 50V, X7R
C2, C4	2	Murata Corp.	GRM188R71E105KA12D	0603	Ceramic 1uF, 25V, X7R
R1, R4, R5	3	Panasonic Corp.	ERJ-3EKF1002V	0603	Resistor 10K Ω , 1/10W, 1%
RSET, RSETA, RSETB	3	Panasonic Corp.	ERJ-3EKF1003V	0603	Resistor 100K Ω , 1/10W, 1%
R2, R3, R6, R7, R8, R9	6			0603	Not populated
Test Point VIN, GND, PGND, VOUT, VOUTA, VOUTB, EN, ENA, ENB, FLG, FLGA, FLGB, VL, VLA, VLB	19	VECTOR	K24C/M	0.042" diameter	Test Point Post

EVALUATION BOARD LAYOUT

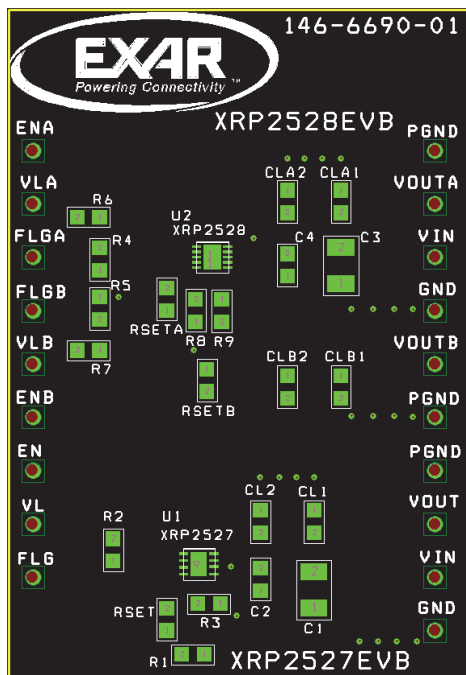


Fig. 28: Component Placement – Top Side

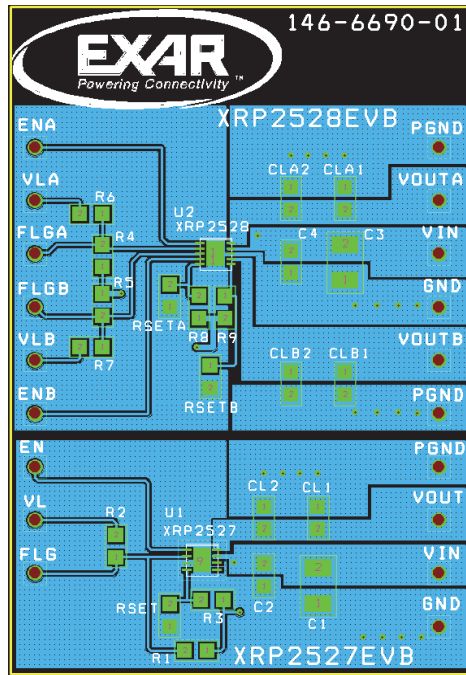


Fig. 29: Top Side Layout

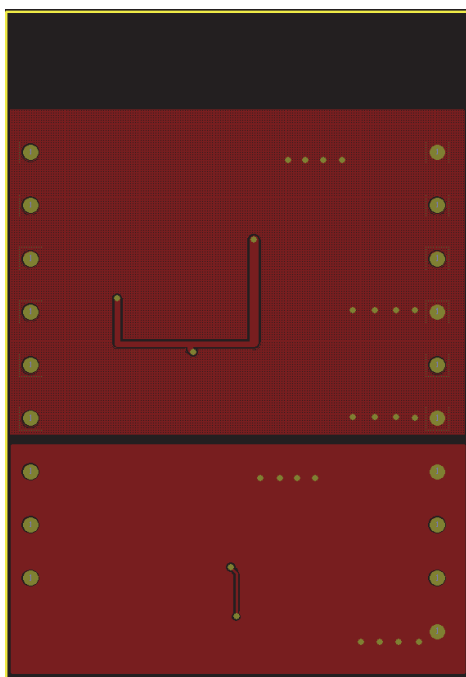


Fig. 30: Bottom Side Layout



XRP2527 / 2528

Single / Dual Channel Adjustable Current Power Distribution Switch

DOCUMENT REVISION HISTORY

Revision	Date	Description
1.0.0	05/13/11	Initial release of evaluation board manual

BOARD REVISION HISTORY

Board Revision	Date	Description
146-6690-01	05/13/11	Initial release of evaluation board

FOR FURTHER ASSISTANCE

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Exar Technical Documentation:

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