XRP2525 - XRP2526

Single / Dual Channel USB 3.0 Power Distribution Switch

July 2011 Rev. 1.1.0

GENERAL DESCRIPTION

The XRP2525 and XRP2526 devices are respectively single and dual channel integrated high-side power distribution switches with independent enables and fault flags. A wide 1.8V to 5.5V input voltage range allows for operations from industry standard 1.8V, 3.3V and 5V power rails.

Optimized for USB V_{BUS} power distribution, the XRP2525 and XRP2526 are compliant with the latest USB 3.0 specification and can be used in any self or bus powered USB applications. The power-switch rise and fall times are controlled to minimize current surges during turn on/off.

The XRP2525 and XRP2526 are pin and function compatible to respectively Exar's SP2525A and SP2526A.

Built-in over current, under voltage lockout (UVLO), reverse current and over temperature protections insure safe operations under abnormal operating conditions.

XRP2525 and XRP2526 are offered in a RoHS compliant "green"/halogen free 8-pin NSOIC package.

APPLICATIONS

- **Self Powered USB 2.0 and 3.0 Hubs**
- **USB Compliant V_{BUS} Power Distribution**
- **Audio-Video Equipments**
- **Generic Power Switching**

FEATURES

- **Single / Dual Channel Current Switch**
  - 900mA per channel capable
  - 1.15A Over-current Limit
  - 1.8V to 5.5V Input Voltage Range
- **USB 2.0 / 3.0 Compliant**
- **Active High or Low Individual Enable**
- **Individual Channel Fault Flag Indicator**
- **Under voltage Lockout, Reverse Current and Thermal Shutdown Protection**
- **RoHS Compliant, Green / Halogen Free 8-Pin NSOIC Package**

TYPICAL APPLICATION DIAGRAM

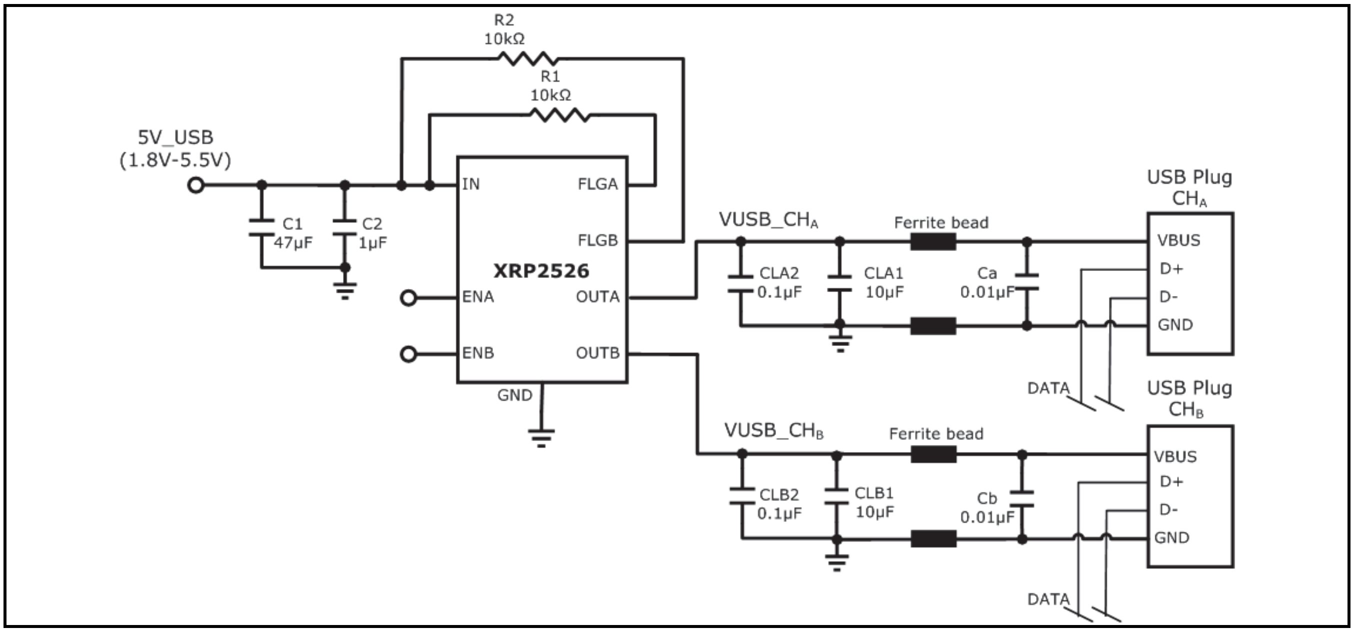


Fig. 1: XRP2526 Application Diagram

ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

V_{IN}	-0.3V to 7.0V
V_{EN}, V_{FLG}	7.0V
Storage Temperature	-65°C to 150°C
Power Dissipation	Internally Limited
Lead Temperature (Soldering, 10 sec)	300°C
ESD Rating (HBM - Human Body Model)	2kV
ESD Rating (MM - Machine Model)	200V

OPERATING RATINGS

Input Voltage Range V_{IN}	1.75V to 5.5V
Junction Temperature Range	-40°C to 125°C
Thermal Resistance θ_{JA}	128.4°C/W

ELECTRICAL SPECIFICATIONS

Specifications are for an Operating Junction Temperature of T_J = 25°C only; limits applying over the full Operating Junction Temperature range are denoted by a "•". Minimum and Maximum limits are guaranteed through test, design, or statistical correlation. Typical values represent the most likely parametric norm at T_J = 25°C, and are provided for reference purposes only. Unless otherwise indicated, 1.8V to 5.5V, C_{IN} = 47μF//1μF, C_{OUT} = 10μF, T_J = −40°C to 125°C.

Parameter	Min.	Typ.	Max.	Units		Conditions
Input Supply Voltage	1.8		5.5	V	•	
Input Quiescent Current		80	150	μA	•	XRP2526 (Both Channels enabled) V_{IN}=5V, I_{OUT1} = I_{OUT2} =0mA
Input Quiescent Current		52	100	μA	•	XRP2525 & XRP2526 (1 Channel enabled) V_{IN}=5V, I_{OUT1} =0mA
Input Shutdown Current			3	μA	•	V_{IN}=5V, Channel(s) disabled
Maximum Output Current per channel	900			mA	•	XRP2525 and XRP2526
Output Leakage Current			10	μA		V_{IN}=5V, V_{OUT}=0V, Each channel, Switch off
Reverse Leakage Current			10	μA		V_{IN}=0V, V_{OUT}=5V, Each channel, Switch off
Output MOSFET Resistance		80	140	mΩ	•	I_{OUT}=0.3A, Each channel
Output turn-on delay		1000		μs		V_{IN}=5V, R_L=10Ω, C_{OUT}=1μF, each output
Output turn-on rise time		2000	4000	μs		V_{IN}=5V, R_L=10Ω, C_{OUT}=1μF, each output
Output turn-off delay		10	20	μs		V_{IN}=5V, R_L=10Ω, C_{OUT}=1μF, each output
Output turn-off fall time		22	50	μs		V_{IN}=5V, R_L=10Ω, C_{OUT}=1μF, each output
Current limit threshold	0.90	1.15	1.40	A	•	V_{IN} − V_{OUT} =0.3V, Internally set
Short Circuit Current Limit		$0.66xI_{LIM}$		A		V_{OUT} =0V
Output Voltage Short Circuit Detect Threshold		925		mV		Operates in short circuit current limit mode when output voltage is below threshold.
Safe Operating Area (SOA) Current Limit		3		A		
Over temperature shutdown threshold		135		°C		Temperature rising
Over temperature shutdown threshold hysteresis		10		°C		Temperature decreasing
Under-voltage lockout threshold	1.55	1.68	1.75	V		V_{IN} rising or falling
Under-voltage lockout hysteresis		50		mV		
FLG output logic low voltage		100	250	mV		I_{FLG}=10mA, V_{IN}=5.5V
FLG output high leakage			1	μA		
FLG blanking time		10		ms		
EN input logic high voltage	1.5			V	•	
EN input logic low voltage			0.5	V	•	
EN input leakage current	-1	0	1	μA		V_{EN}=0V or V_{EN}=5.5V

BLOCK DIAGRAM

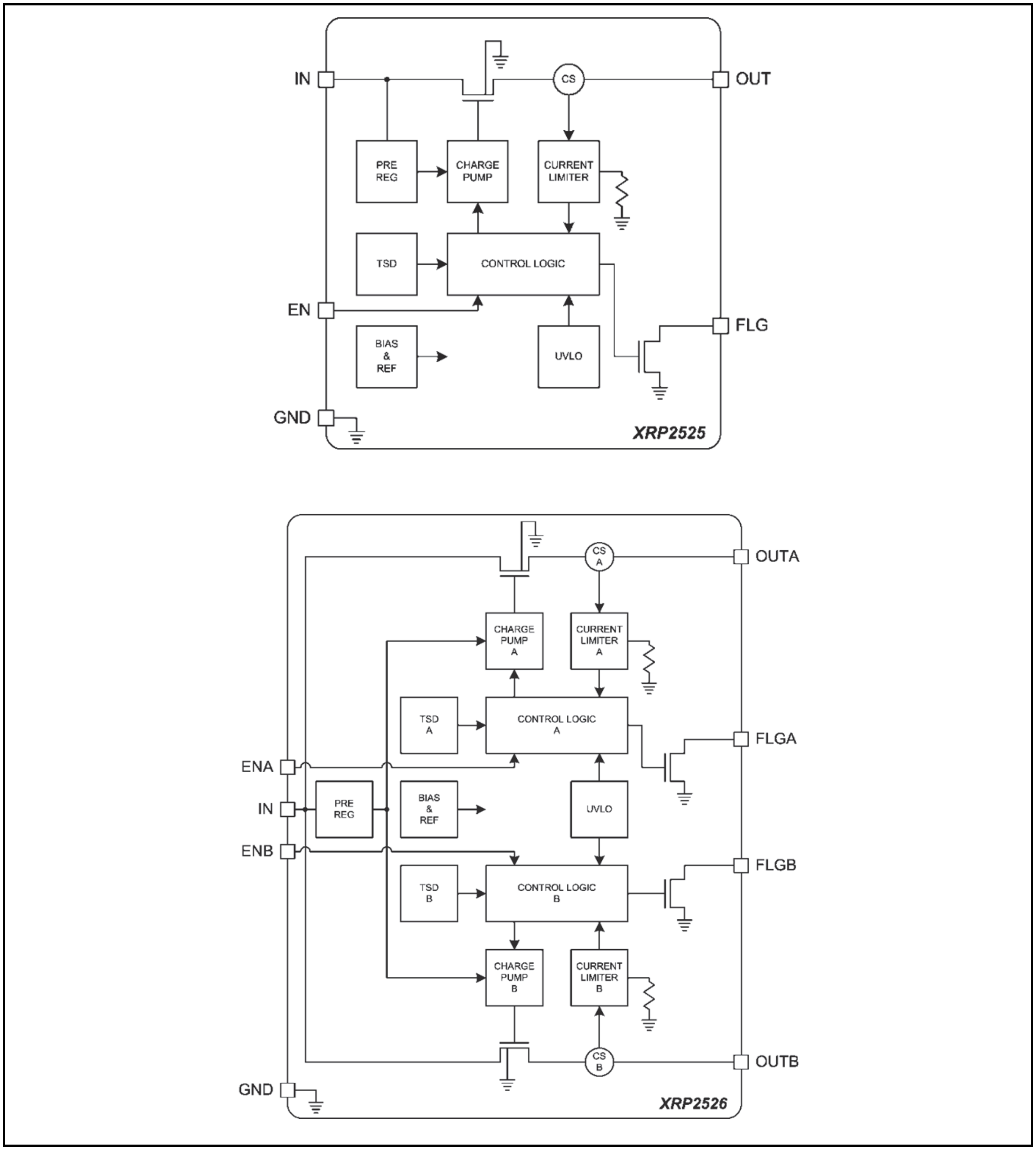


Fig. 2: XRP2525 and XRP2526 Block Diagrams

PIN ASSIGNMENT

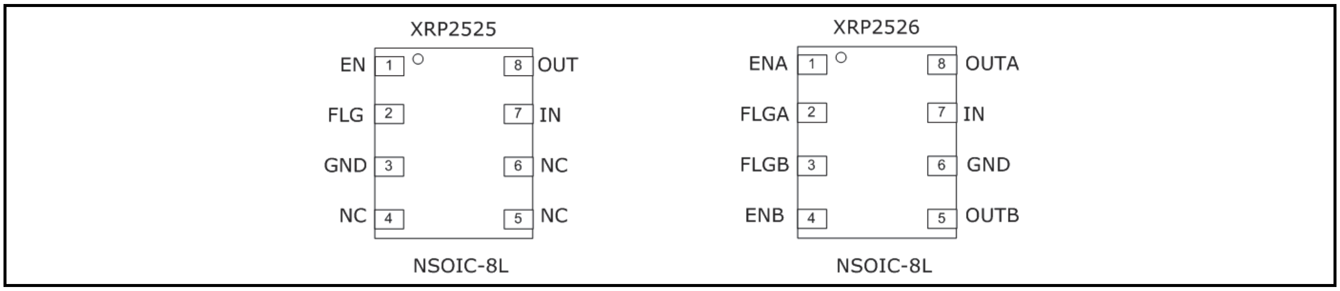


Fig. 3: XRP2525 - XRP2526 Pin Assignment

PIN DESCRIPTION – XRP2525

Name	Pin Number	Description
EN	1	Channel Enable Input Active High for XRP2525-1 and Active Low for XRP2525-2
FLG	2	Error Flag Signal Active low open drain output. Active on over-current, over-temperature or UVLO conditions.
GND	3	Ground Signal
NC	4,5,6	No Connect
IN	7	Voltage Input Pin
OUT	8	Voltage Output Pin

PIN DESCRIPTION – XRP2526

Name	Pin Number	Description
EN$_X$	1,4	Channel Enable Input Active High for XRP2526-1 and Active Low for XRP2526-2
FLG$_X$	2,3	Error Flag Signal Active low open drain output. Active on over-current, over-temperature or UVLO conditions.
GND	6	Ground Signal
IN	7	Voltage Input Pin
OUT$_X$	5,8	Voltage Output Pin

ORDERING INFORMATION

Part Number	Temperature Range	Marking	Package	Packing Quantity	Note 1	Note 2
XRP2525ID-1-F	-40°C≤T_A≤+85°C	2525ID 1 YYWW X	NSOIC8	Bulk	Lead Free and Halogen Free	Single Channel Active high
XRP2525IDTR-1-F				2.5K/Tape & Reel		
XRP2525ID-2-F	-40°C≤T_A≤+85°C	2525ID 2 YYWW X	NSOIC8	Bulk	Lead Free and Halogen Free	Single Channel Active low
XRP2525IDTR-2-F				2.5K/Tape & Reel		
XRP2526ID-1-F	-40°C≤T_A≤+85°C	2526ID 1 YYWW X	NSOIC8	Bulk	Lead Free and Halogen Free	Dual Channel Active high
XRP2526IDTR-1-F				2.5K/Tape & Reel		
XRP2526ID-2-F	-40°C≤T_A≤+85°C	2526ID 2 YYWW X	NSOIC8	Bulk	Lead Free and Halogen Free	Dual Channel Active low
XRP2526IDTR-2-F				2.5K/Tape & Reel		
XRP2525EVB	XRP2525 Evaluation Board					
XRP2526EVB	XRP2526 Evaluation Board					

“YY” = Year – “WW” = Work Week – “X” = Lot Number; when applicable.

TYPICAL PERFORMANCE CHARACTERISTICS

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

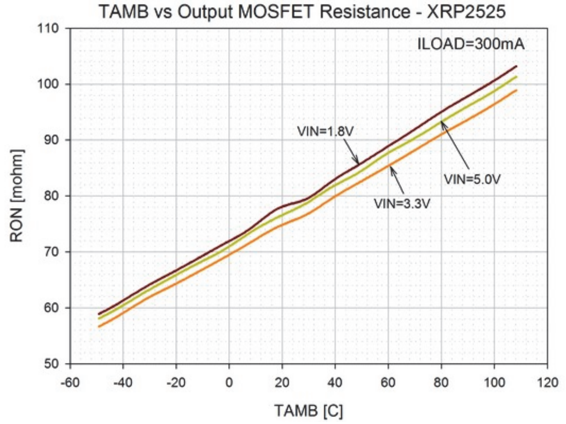


Fig. 4: Output On-Resistance vs. Temperature (XRP2525)

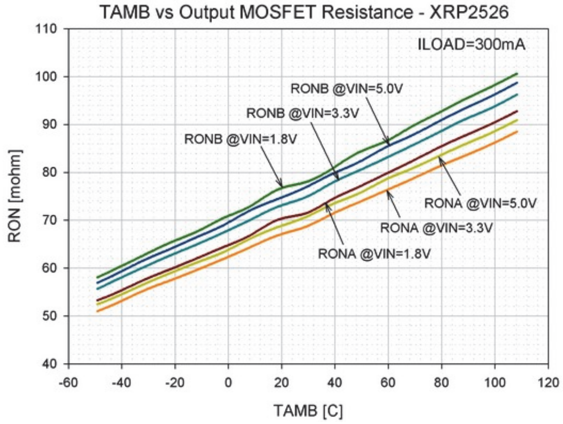


Fig. 5: Output On-Resistance vs. Temperature (XRP2526)

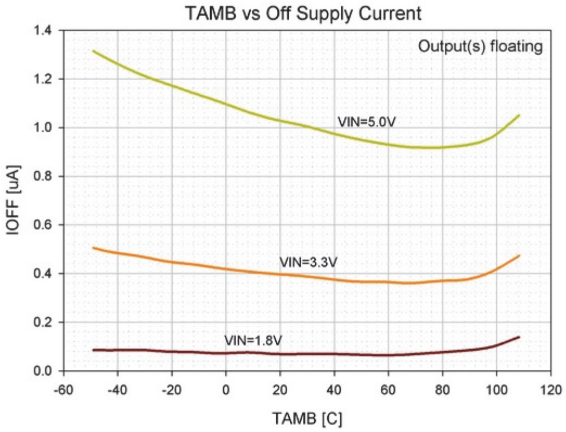


Fig. 6: Off Supply Current vs. Temperature

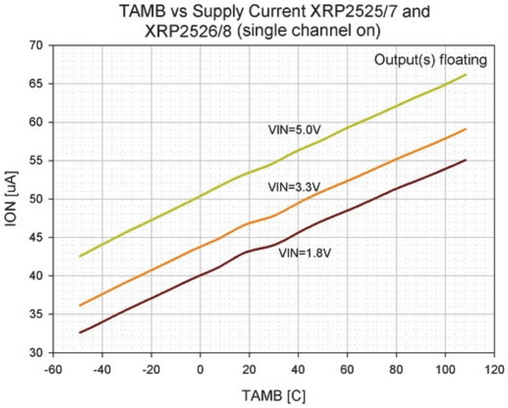


Fig. 7: Quiescent Current vs. Temperature
XRP2525 and XRP2526 (1-channel on)

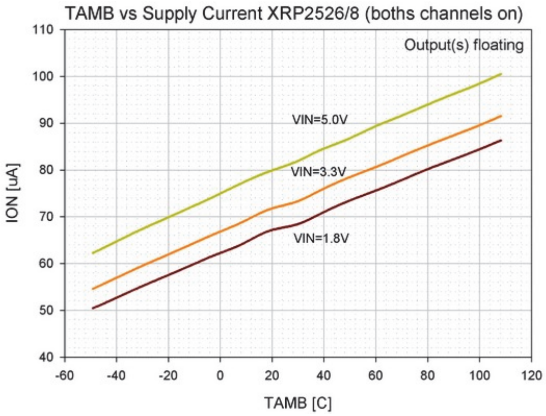


Fig. 8: Quiescent Current vs. Temperature
XRP2526 (2-channels on)

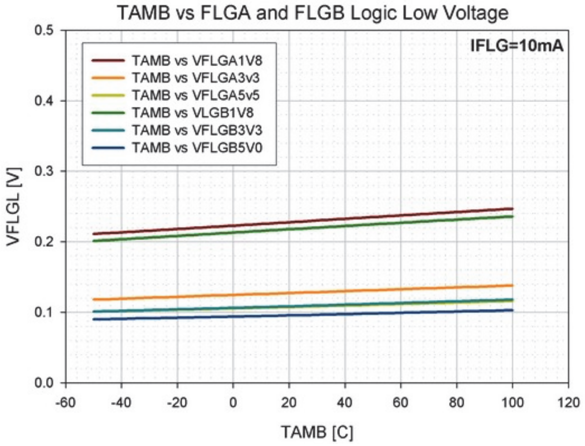


Fig. 9: FLG Logic Low Voltage vs. Temperature

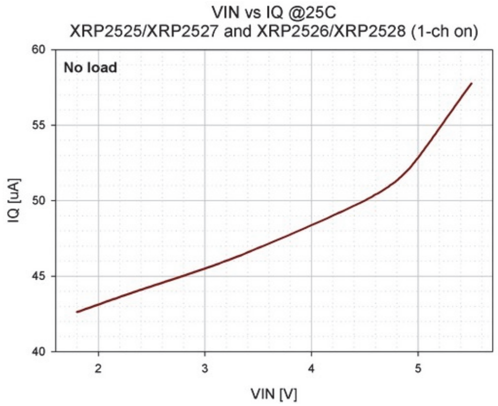


Fig. 10: Quiescent Current vs. Input Voltage XRP2525 and XRP2526 (1-channel on)

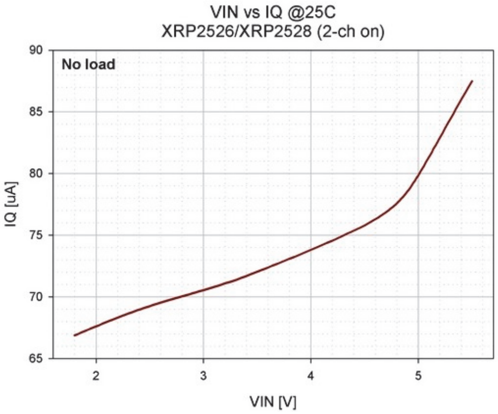


Fig. 11: Quiescent Current vs. Input Voltage XRP2526 (2-channels on)

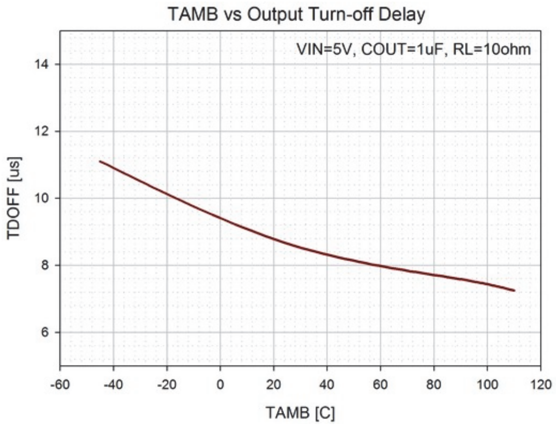


Fig. 12: Output Turn-Off Delay vs. Temperature

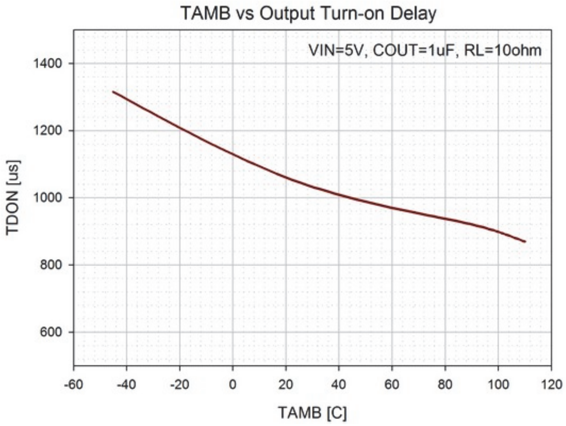


Fig. 13: Output Turn-on Delay vs. Temperature

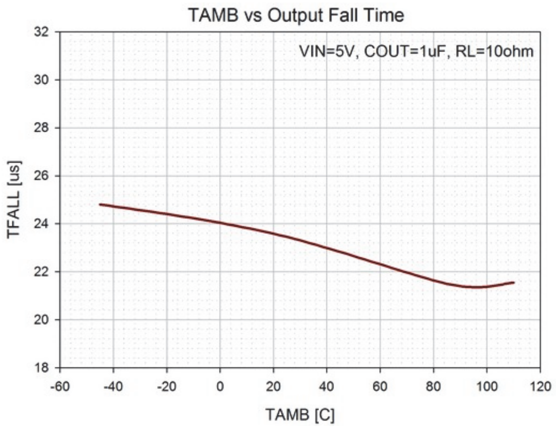


Fig. 14: Output Fall Time vs. Temperature

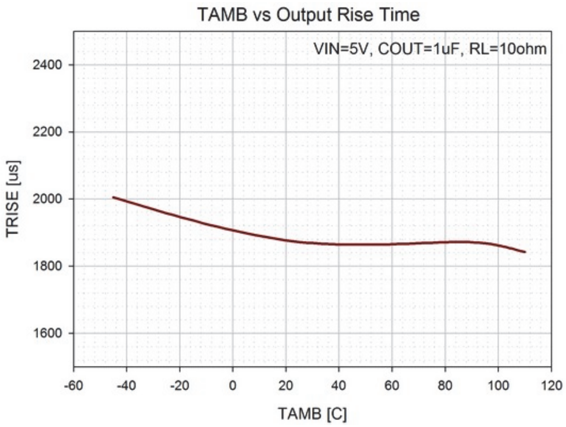


Fig. 15: Output Rise Time vs. Temperature

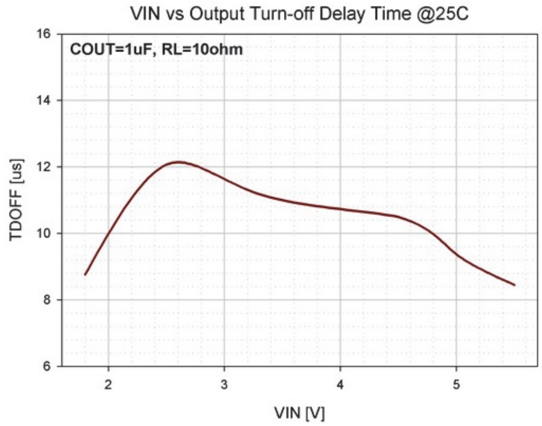


Fig. 16: Output Turn-Off Delay Time vs. Input Voltage

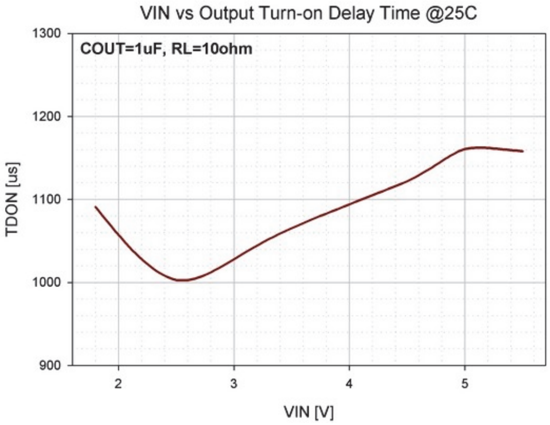


Fig. 17: Output Turn-On Delay Time vs. Input Voltage

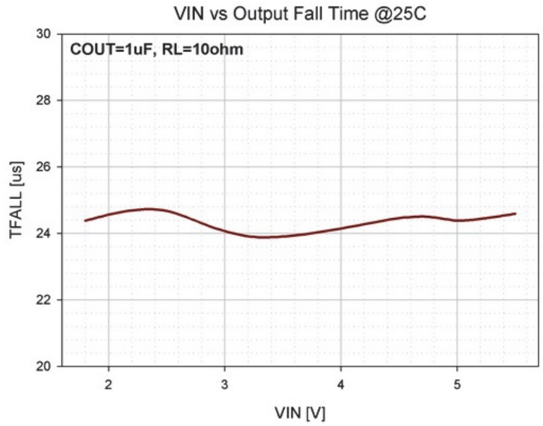


Fig. 18: Output Fall Time vs. Input Voltage

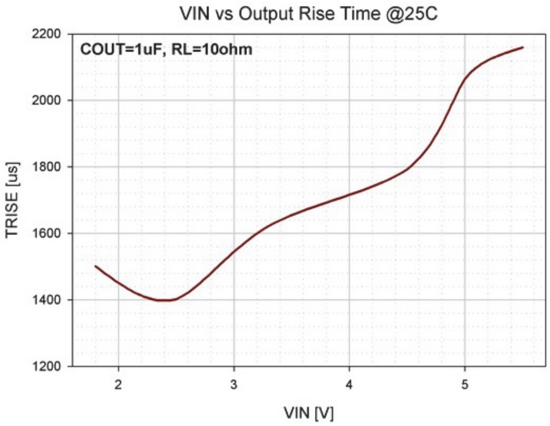


Fig. 19: Output Rise Time vs. Input Voltage

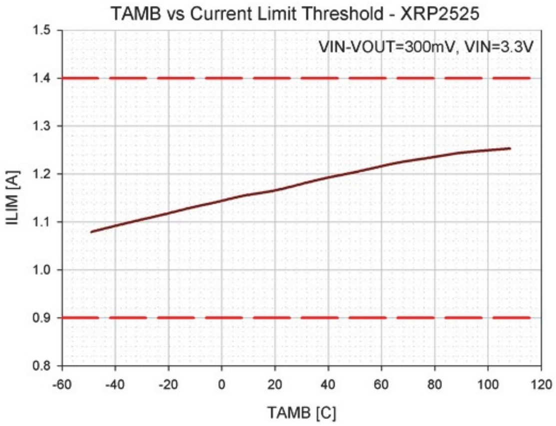


Fig. 20: Current Limit Threshold vs. Temperature (XRP2525)

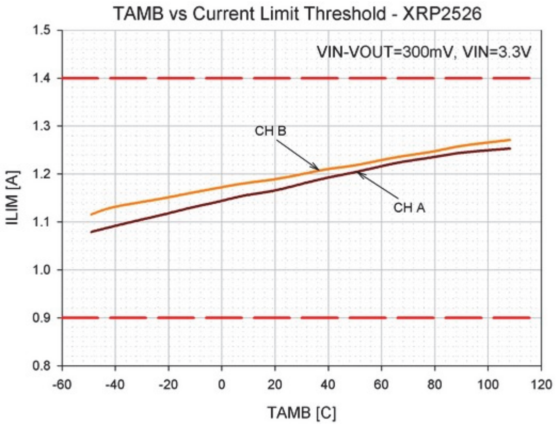


Fig. 21: Current Limit Threshold vs. Temperature (XRP2526)

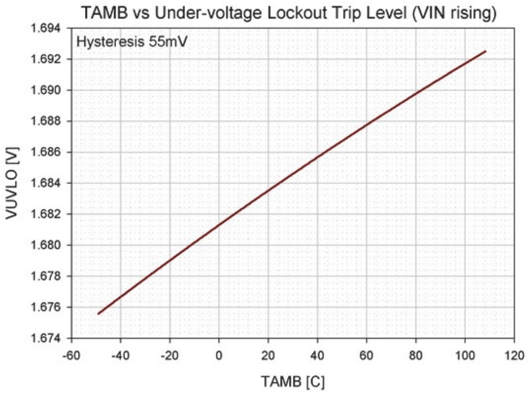


Fig. 22: Under-voltage lockout trip level vs. Temperature (VIN Rising)

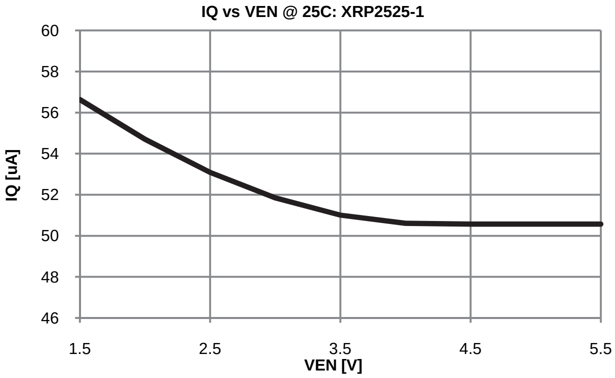


Fig. 23: Quiescent Current vs. Enable pin Voltage XRP2525-1

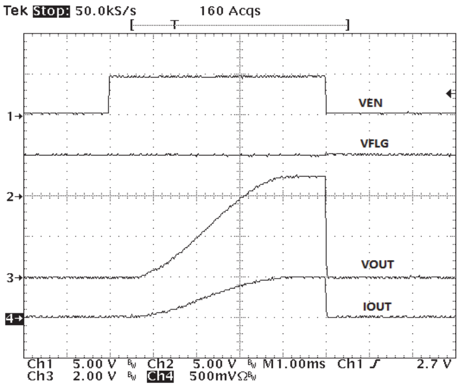


Fig. 24: Turn-On, Turn-Off Characteristics (XRP2526-1) COUT = 1uF, Rload = 10Ω

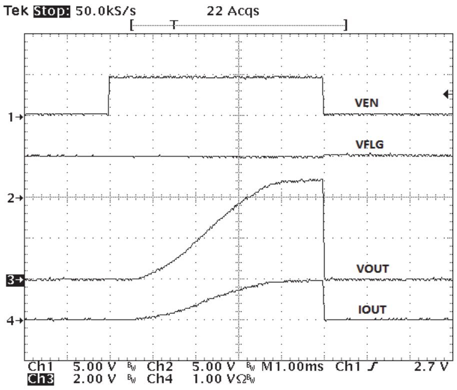


Fig. 25: Turn-On, Turn-Off Characteristics (XRP2526-1) COUT = 1uF, Rload = 5.1Ω

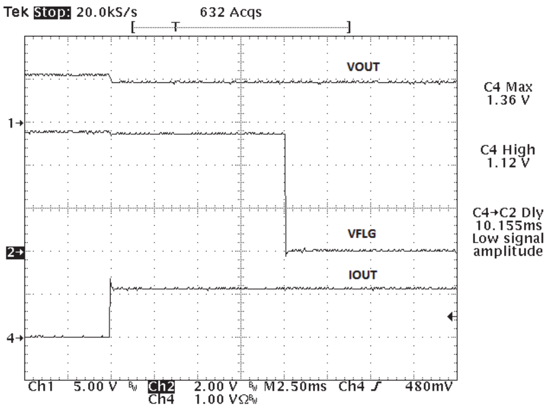


Fig. 26: Current Limit Operation (XRP2525-1): VIN=5.5V, Rload = 3.9Ω

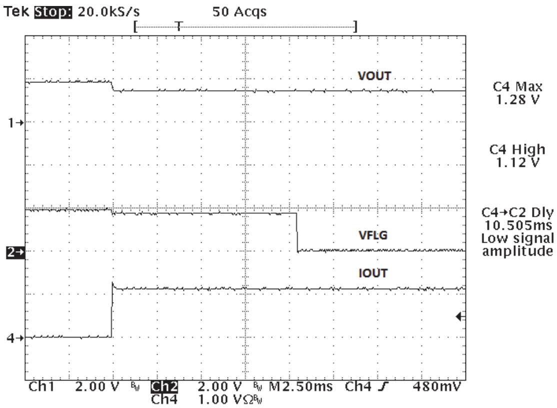


Fig. 27: Current Limit Operation (XRP2526-1): VIN=1.8V, Rload = 1.5Ω

THEORY OF OPERATION

The XRP2525 and XRP2526 devices are respectively single and dual channel integrated high-side power distribution switches that can be used in any self or bus powered USB applications. They are compliant with the latest USB 3.0 specifications. The reverse current protection feature prevents current to flow from OUT to IN when the device is disabled.

INPUT & OUTPUT

Placing bulk capacitances of at least 47µF and 10µF at the input and output pins respectively reduces power supply transients under heavy current load conditions.

It is important to place a 1µF ceramic bypass capacitor from IN to GND as close as possible to the device in order to control supply transients.

Furthermore, bypassing the output pin with a 0.1µF to 1µF ceramic capacitor improves the device response to short-circuit transients.

ERROR FLAG

The error flag signal (FLG_X output pin) is an open-drain output and is pulled low (active low) upon detection of the following conditions:

- Over-current condition
- Over-temperature condition
- Under voltage lockout condition

Over-temperature and under voltage lockout conditions are flagged immediately while the over – current condition is reported only if this condition persists continuously for longer than the blanking time of 10ms. The blanking time prevents erroneous reporting of current faults due to brief output current spikes.

Once activated, the error flag signal remains low until all fault conditions have been removed and is independent for each individual channel.

CURRENT LIMIT

The current limit threshold is preset internally. It protects the output MOSFET switches from damages resulting from undesirable short circuit conditions or excess inrush current, which is often encountered during hot plug-in. The low limit of the current limit threshold of the XRP2525 and XRP2526 allows a minimum current of 0.9A through the MOSFET switches.

When an overcurrent condition is detected, the output current is limited to a constant current limit threshold value and output voltage is reduced accordingly. Triggering the current limit function is signaled by the Error Flag after 10ms of blanking time period.

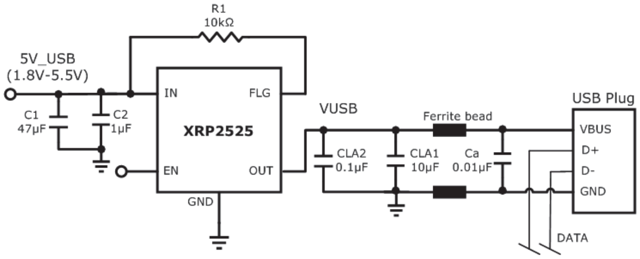
UNDER-VOLTAGE LOCKOUT

Under-voltage lockout function (UVLO) keeps the internal power switch from being turned on until the power supply has reached at least 1.68V, even if the switch is enabled. Upon detection of an input voltage below approximately 1.68V, the power switch is turned off while a fault condition is reported by the error flag signal.

THERMAL PROTECTION

Internal thermal sensing circuitry monitors the operating temperature of the device for each channel independently. Upon detection of a temperature in excess of 135°C, the power switch for the given channel is disabled preventing any damages to the device while a fault condition is reported by the error flag signal. A built-in 10°C hysteresis allows the device to cool down to 125°C before resuming normal operations on the faulty channel at which point the error flag signal is cleared.

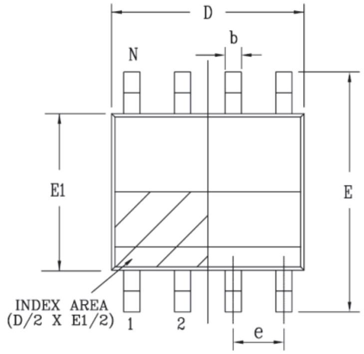
TEST CIRCUIT



PACKAGE SPECIFICATION

8-PIN NSOIC

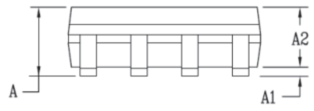
REVISION HISTORY			
REV.	DISCRIPTION	DATE	APP'D
A	DRAWING ORIGINATION	08/16/05	JL
B	DRAWING FORMAT MODIFICATION	07/19/06	JL
C	CHANGE DRAWING LOGO ADN COMPANY NAME	11/16/07	JL



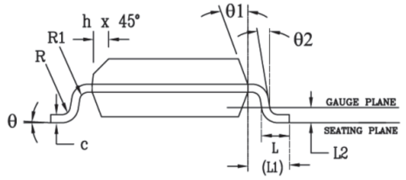
Top View

8 Pin SOICN JEDEC MS-012 Variation AA

SYMBOLS	DIMENSIONS IN MM (Control Unit)			DIMENSIONS IN INCH (Reference Unit)		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	—	1.75	0.053	—	0.069
A1	0.10	—	0.25	0.004	—	0.010
A2	1.25	—	1.65	0.049	—	0.065
b	0.31	—	0.51	0.012	—	0.020
c	0.17	—	0.25	0.007	—	0.010
E	6.00 BSC			0.236 BSC		
E1	3.90 BSC			0.154 BSC		
e	1.27 BSC			0.050 BSC		
h	0.25	—	0.50	0.010	—	0.020
L	0.40	—	1.27	0.016	—	0.050
L1	1.04 REF			0.041 REF		
L2	0.25 BSC			0.010 BSC		
R	0.07	—	—	0.003	—	—
R1	0.07	—	—	0.003	—	—
θ	0°	—	8°	0°	—	8°
θ1	5°	—	15°	5°	—	15°
θ2	0°	—	—	0°	—	—
D	4.90 BSC			0.193 BSC		
N	8			8		



Side View



Front View

	EXAR CORPORATION
	8 PIN SOICN PACKAGE OUTLINE
Packaging Approval:	Drawing No: 8-PIN SOICN
By: JL Date: 11/16/07	Revision: C Sheet: 1 OF 1

REVISION HISTORY

Revision	Date	Description
1.0.0	05/13/2011	Initial release of datasheet
1.1.0	07/14/2011	Corrections of typographical errors

FOR FURTHER ASSISTANCE

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ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- *Конкурентоспособные цены и скидки постоянным клиентам.*
- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

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