



### Features

- Efficient, low-cost solution for driving MOSFETs and IGBTs
- Wide supply voltage operating range: 4.5V to 18V
- 1.9A source / 1.8A sink output current capability
- Inverting and non-inverting input configurations
- Fast propagation delays (35ns typical)
- Fast rise and fall times (15ns typical)
- Logic input (IN) 3.3V capability
- Offered in two different pinout options
- Space saving SOT23-5L package
- Extended temperature range: -40°C to +125°C

### Applications

- Switch mode power supplies
- Motor Drive
- Line Drivers
- DC-DC Converters



### Description

The TF0215(S)/16(S) high speed, low side MOSFET and IGBT drivers are capable of driving 1.9A of peak current. The TF0215(S)/16(S) logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) to interface easily with MCUs. Fast and well matched propagation delays allow high speed operation, enabling a smaller, more compact power switching design using smaller associated components.

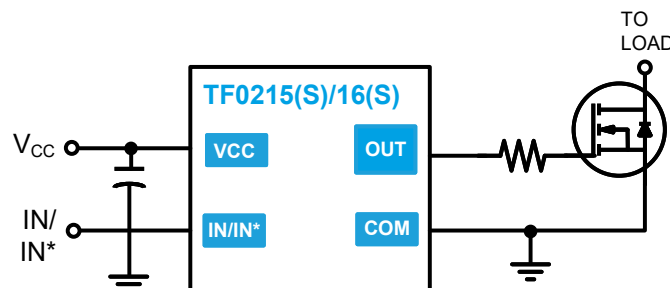
These devices are highly resistant to noise by being able to withstand up to 5V positive or negative on the input pin without damage. Also they can accept 500mA of reverse current forced back into its outputs without damage or logic change. The TF0215(S) provides an inverted output and the TF0216(S) provides a noninverting output. The TF0215 and TF0216 provide a different pinout to the TF0215S and TF0216S. The TF0215(S)/16(S) comes in a space-saving SOT23-5L package and it operates over an extended -40 °C to +125 °C temperature range.

### Ordering Information

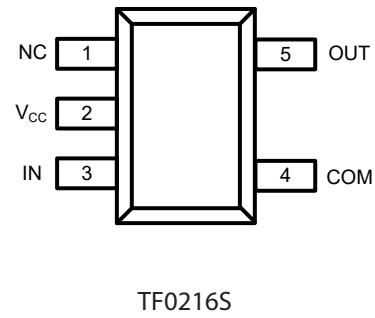
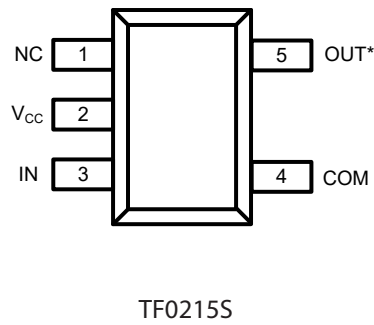
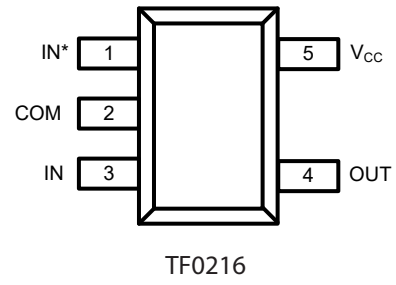
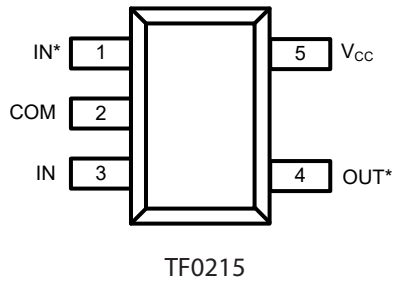
Year Year Week Week

PART NUMBER	PACKAGE	PACK / Qty	MARK
TF0215-USQ	SOT23-5L	T&R / 3,000	YYWW TF0215/16
TF0216-USQ	SOT23-5L	T&R / 3,000	
TF0215S-USQ	SOT23-5L	T&R / 3,000	YYWW TF0215S/16S
TF0216S-USQ	SOT23-5L	T&R / 3,000	

### Typical Application



### Pin Diagrams

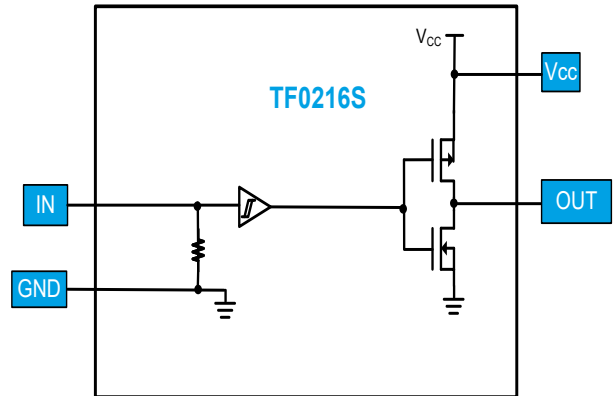
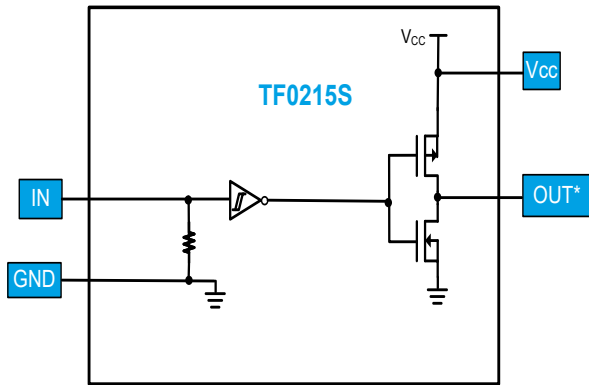
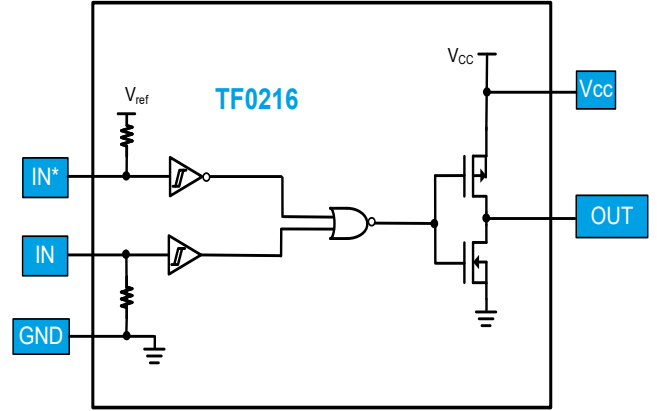
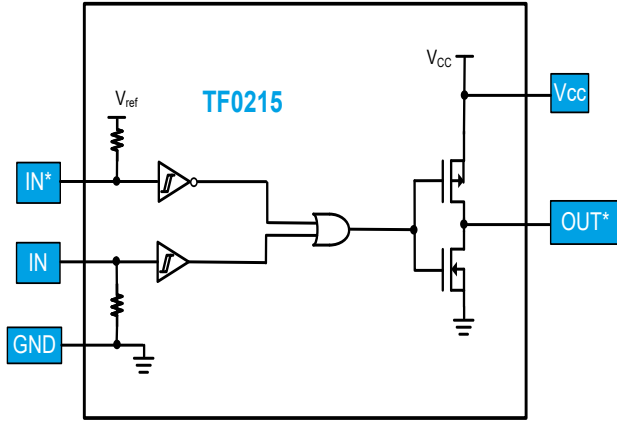


Top View: SOT23-5L

### Pin Descriptions

PIN NAME	PIN DESCRIPTION
IN*	Logic input, in phase with OUT* (TF0215), out of phase with OUT (TF0216), leave open when not in use.
COM	Supply return
IN	Logic input, out of phase with OUT* (TF0215(S)), in phase with OUT (TF0216(S)), leave open when not in use.
OUT	Gate drive output
OUT*	Gate drive output, inverted
V <sub>CC</sub>	Supply input
NC	No connect

Functional Block Diagram



### Absolute Maximum Ratings *(NOTE1)*

$V_{CC}$  - Low-side fixed supply voltage.....-0.3V to +22V  
 $V_{OUT}$  - Output voltage (OUT/OUT\*).....-0.3V to  $V_{CC} + 0.3V$   
 $V_{IN}$  - Logic input voltage (IN/IN\*).....-5V to  $V_{CC} + 0.3V$   
 ESD Protection on all pins.....2kV (HBM)  
 400V (MM)

$P_D$  - Package power dissipation at  $T_A \leq 25^\circ C$   
 SOT23-5L.....0.54W  
 SOT23-5L Thermal Resistance *(NOTE2)*  
 $\theta_{JA}$ .....188  $^\circ C/W$   
 $T_J$  - Junction operating temperature.....+150  $^\circ C$   
 $T_L$  - Lead Temperature (soldering, 10 seconds).....+300  $^\circ C$   
 $T_{stg}$  - Storage temperature .....-55 to 150  $^\circ C$

**NOTE1** Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**NOTE2** When mounted on a standard JEDEC 2-layer FR-4 board.

### Recommended Operating Conditions

Symbol	Parameter	MIN	MAX	Unit
$V_{CC}$	Supply voltage	4.5	18	V
$V_{OUT}$	Output voltage (OUT/OUT*)	0	$V_{CC}$	V
$V_{IN}$	Logic input voltage (IN/IN*)	0	5	V
$T_A$	Ambient temperature	-40	125	$^\circ C$

**Electrical Characteristics** (NOTE3)

 $V_{BIAS}$  (4.5V <  $V_{CC}$  < 18V),  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified.

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
<b>DC Characteristics</b>						
$V_{IH}$	Logic "1" input voltage		2.4	1.6		V
$V_{IL}$	Logic "0" input voltage			1.3	0.8	
$I_{IN+}$	Logic "1" input bias current	$V_{IN} = 3V, V_{IN*} = 0V$			5	$\mu\text{A}$
$I_{IN-}$	Logic "0" input bias current	$V_{IN} = 0V, V_{IN*} = 3V$			2	
$V_{OH}$	High level output voltage, $V_{BIAS} - V_O$			25		mV
$V_{OL}$	Low level output voltage			25		
$I_{CCQ}$	$V_{CC}$ quiescent supply current	$V_{IN} = 0V$ or $3V$		50	100	$\mu\text{A}$
$I_{O+}$	Output high short circuit pulsed current	$V_{CC} = 12V$		1.9		A
$I_{O-}$	Output low short circuit pulsed current	$V_{CC} = 12V$		1.8		
$R_{OH}$	Output Resistance, High	$I_{OUT} = 10\text{mA}, V_{CC} = 12V$		3.3		$\Omega$
$R_{OL}$	Output Resistance, Low	$I_{OUT} = 10\text{mA}, V_{CC} = 12V$		2.3		$\Omega$
<b>Switching Characteristics</b>						
$t_r$	Turn-on rise time	$C_L = 1000\text{pF}, V_{CC} = 12V$		15	25	ns
$t_f$	Turn-off fall time	$C_L = 1000\text{pF}, V_{CC} = 12V$		15	25	ns
$t_{on}$	Turn-on propagation delay	$V_{CC} = 12V$		35	50	ns
$t_{off}$	Turn-off propagation delay	$V_{CC} = 12V$		35	55	ns

**NOTE3** The  $V_{IN}$  and  $I_{IN}$  parameters are applicable to the logic input pin: IN and IN\*. The  $V_O$  and  $I_O$  parameters are applicable to the output pins: OUT and OUT\*

# Timing Waveforms

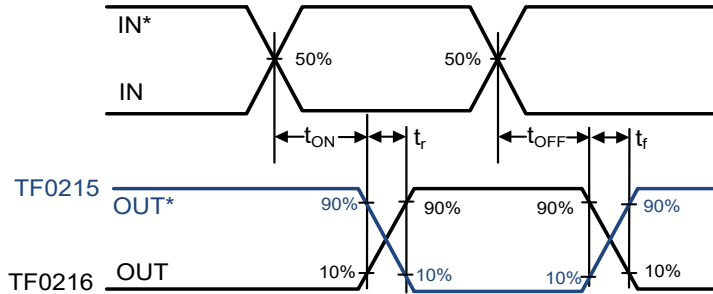


Figure 1. Switching Time Waveform Definitions

## Input/Output response table

IN	IN*	TF0215 (OUT*)	TF0216 (OUT)
H	H (open)	L	H
L	H (open)	H	L
L (open)	H	H	L
L (open)	L	L	H

IN	TF0215S (OUT*)	TF0216S (OUT)
H	L	H
L	H	L
L (open)	H	L

Typical performance graphs

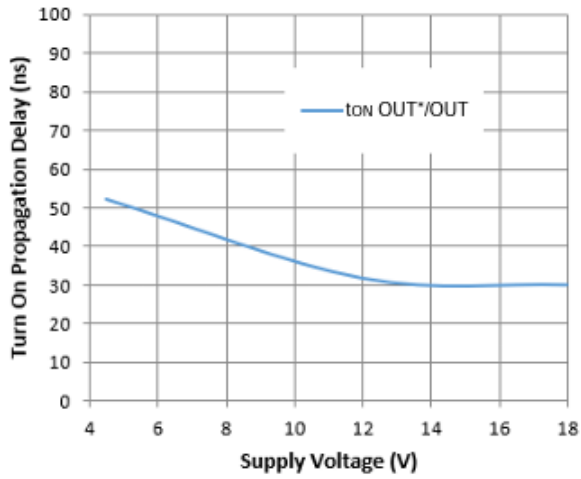


Figure 2. Turn-on Propagation Delay vs. Supply Voltage

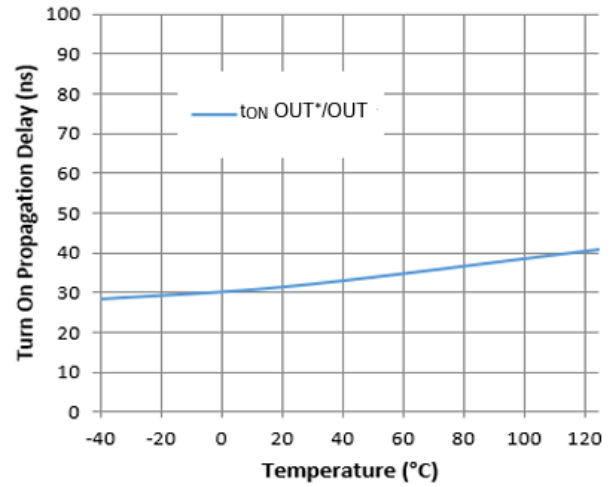


Figure 3. Turn-on Propagation Delay vs. Temperature

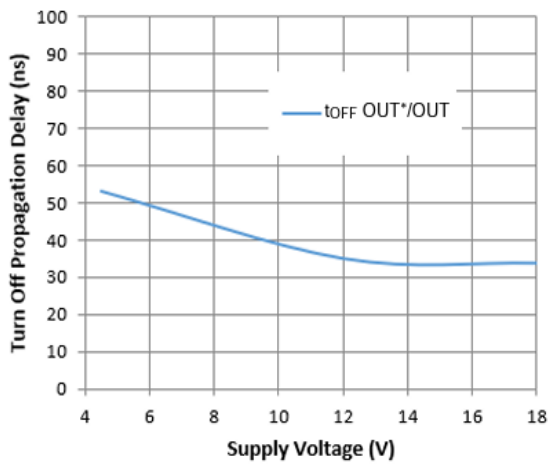


Figure 4. Turn-off Propagation Delay vs. Supply Voltage

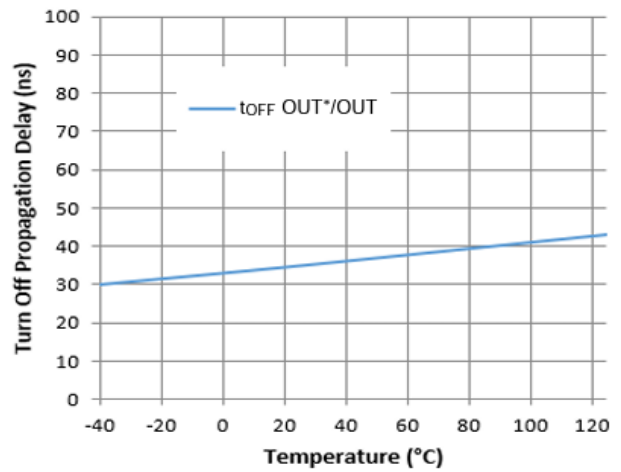


Figure 5. Turn-off Propagation Delay vs. Temperature

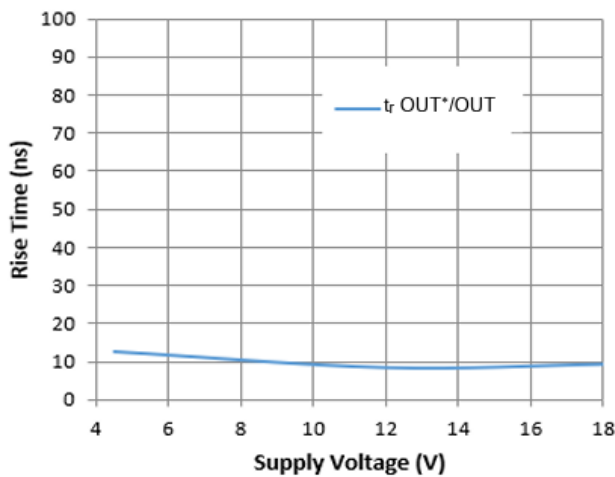


Figure 6. Rise Time vs. Supply Voltage

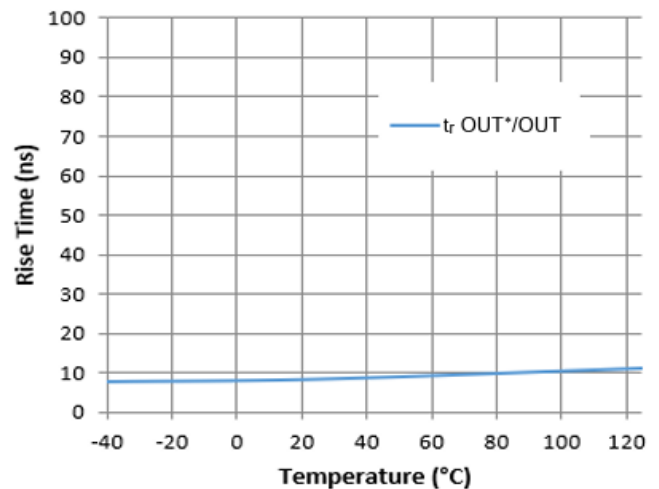


Figure 7. Rise Time vs. Temperature

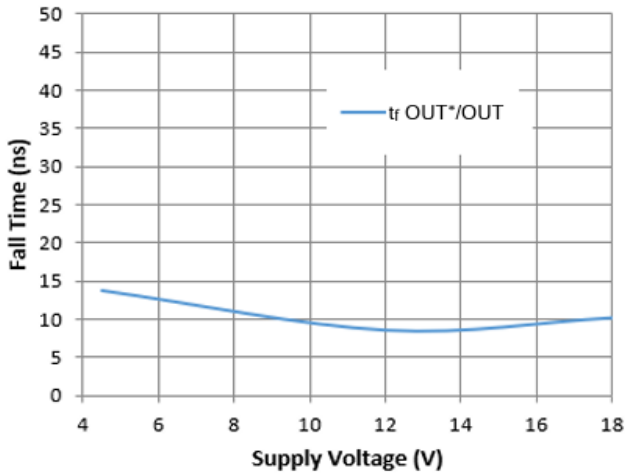


Figure 8. Fall Time vs. Supply Voltage

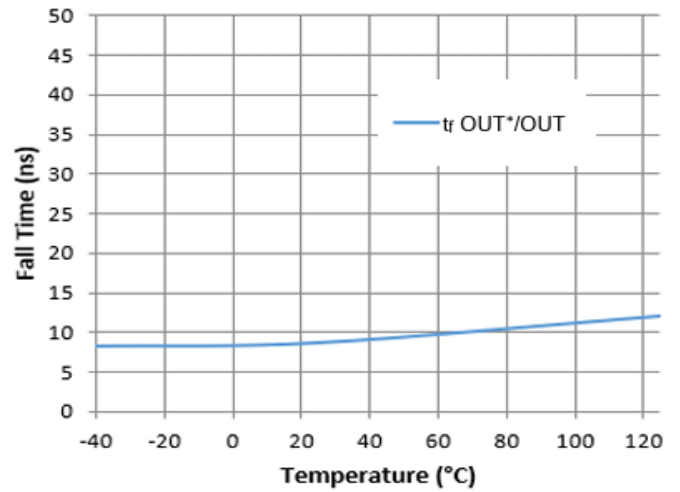


Figure 9. Fall Time vs. Temperature

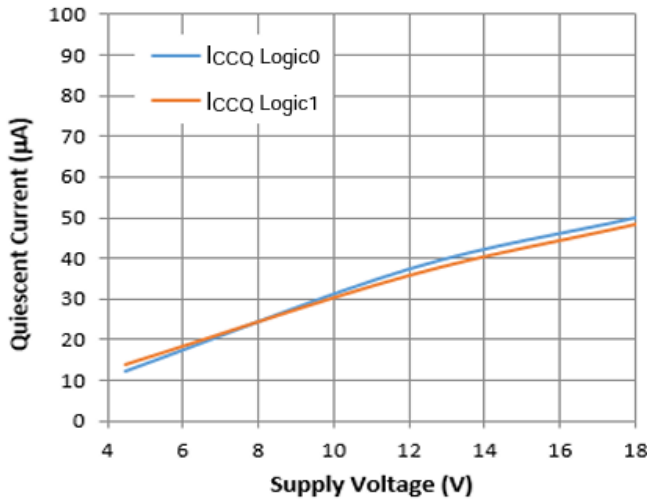


Figure 10. Quiescent Current vs. Supply Voltage

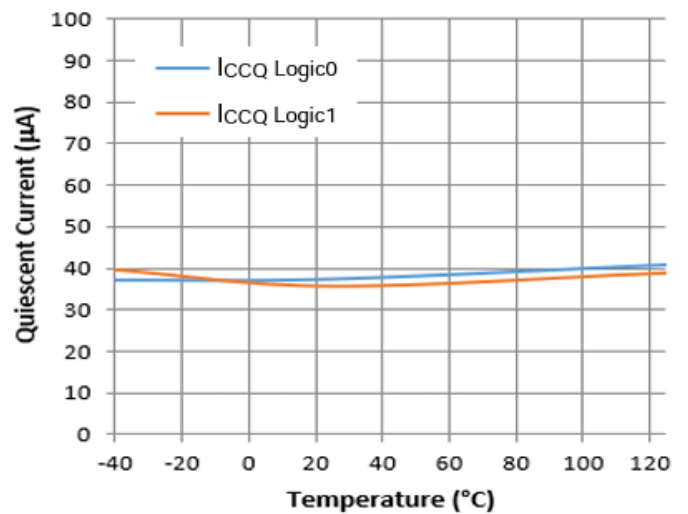


Figure 11. Quiescent Current vs. Temperature

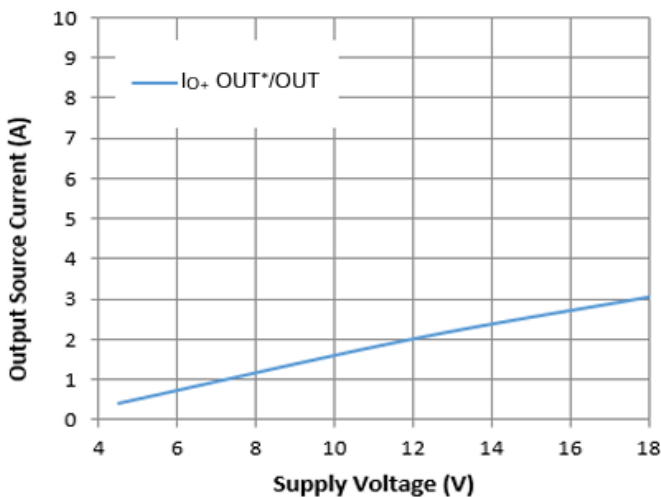


Figure 12. Output Source Current vs. Supply Voltage

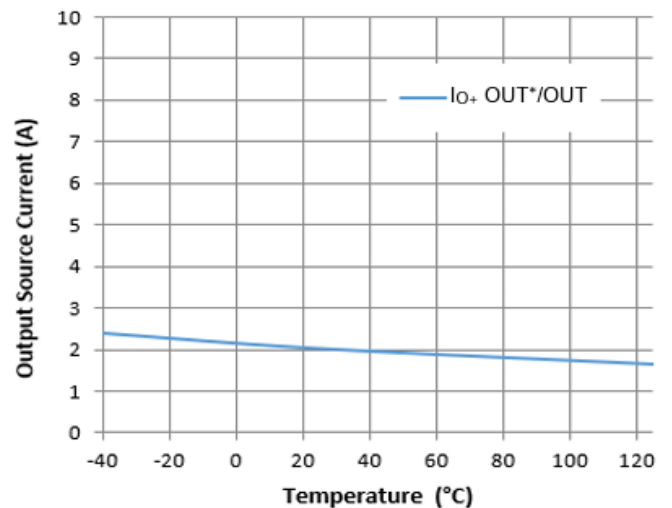


Figure 13. Output Source Current vs. Temperature



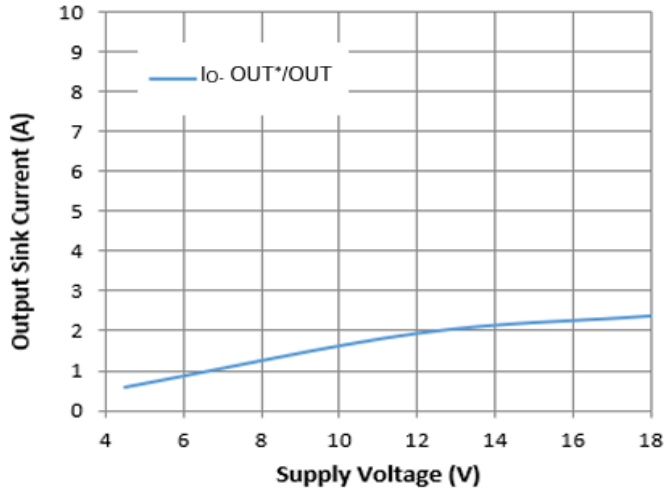


Figure 14. Output Sink Current vs. Supply Voltage

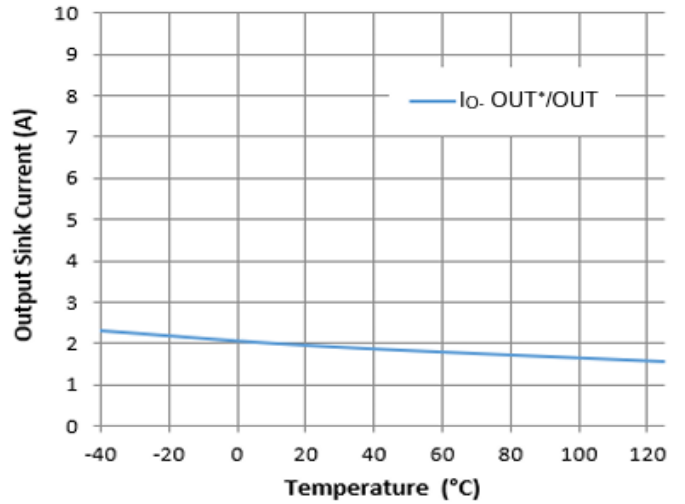


Figure 15. Output Sink Current vs. Temperature

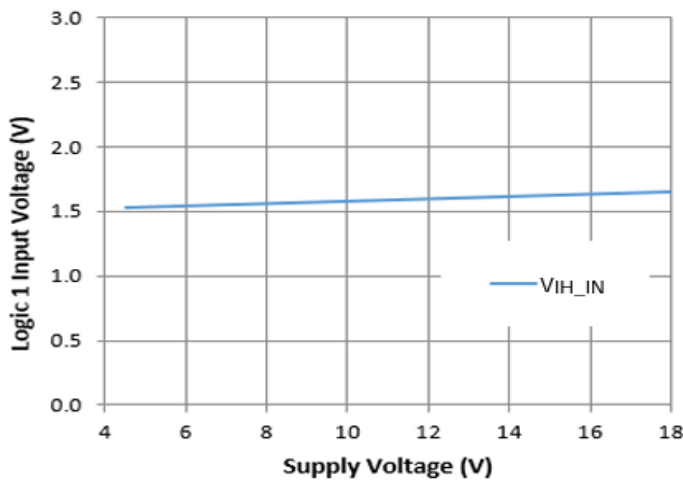


Figure 16. Logic 1 Input Voltage vs. Supply Voltage

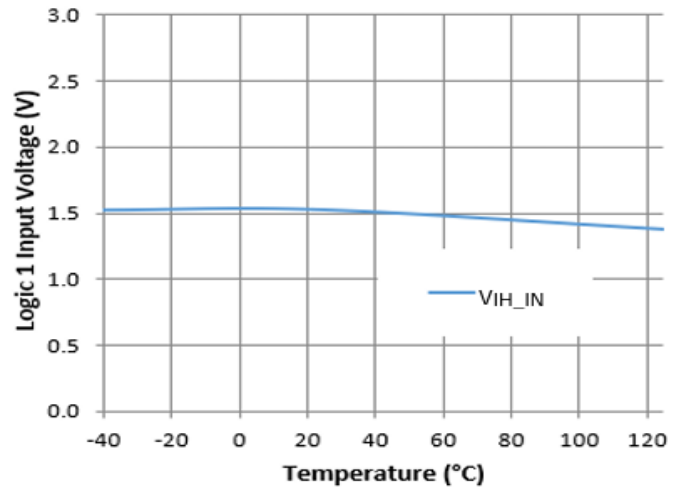


Figure 17. Logic 1 Input Voltage vs. Temperature

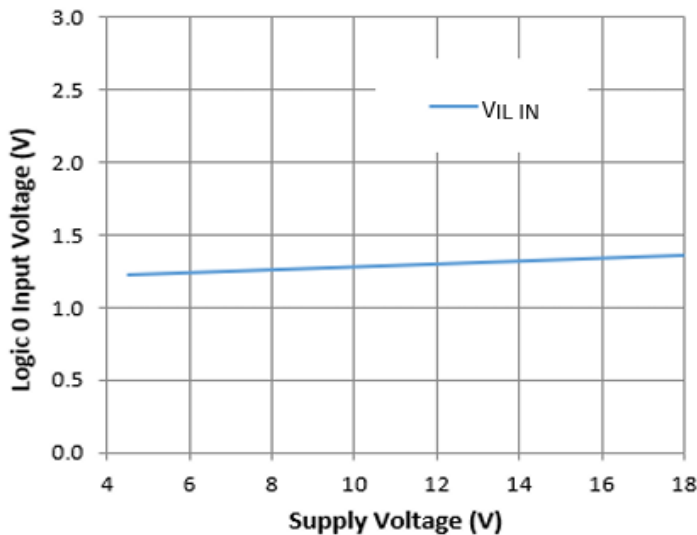


Figure 18. Logic 0 Input Voltage vs. Supply Voltage

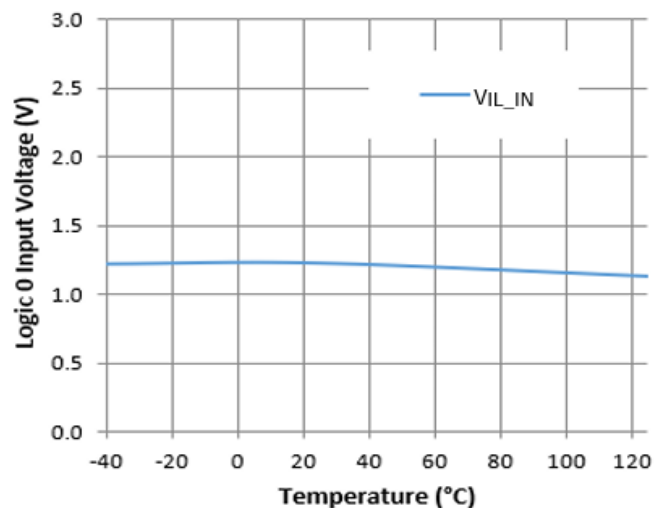
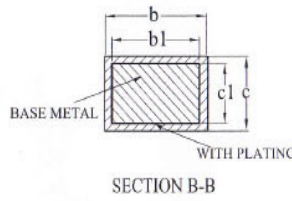
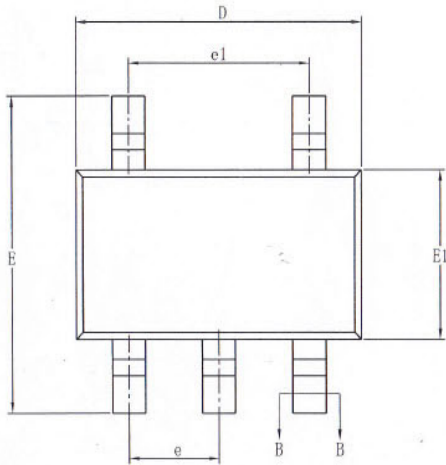
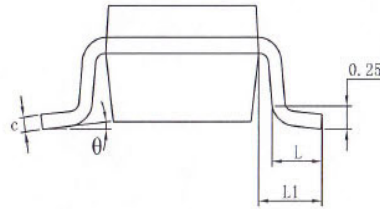
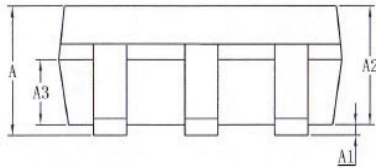


Figure 19. Logic 0 Input Voltage vs. Temperature

Package Dimensions (SOT23-5L)

Please contact support@tfsemi.com for package availability.



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.25
A1	0.04	—	0.10
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.33	—	0.41
b1	0.32	0.35	0.38
c	0.15	—	0.19
c1	0.14	0.15	0.16
D	2.82	2.92	3.02
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95BSC		
e1	1.90BSC		
L	0.30	—	0.60
L1	0.60REF		
$\theta$	0	—	8°

## Revision History

Rev.	Change	Owner	Date
1.0	First release, final datasheet	Keith Spaulding	4/16/2021
2.0	Change of revision numbering only	Keith Spaulding	4/7/2023
2.1	Change package drawing	Keith Spaulding	6/10/2023
2.2	Add TF0215S/TF0216S pinout option to ds	Keith Spaulding	6/19/2023
2.3	Remove Electrical specifications table with over temperature conditions, Added Ordering information table on pg. 1, Added Typical performance graphs	Keith Spaulding	6/29/2023

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