TF0215/16

High Speed, Low-Side, Single Gate Driver

TF Semiconductor Solutions

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**
- **Undervoltage lockout for V_{CC} supply.**
- **Fast propagation delays (35ns typical)**
- **Fast rise and fall times (15ns typical)**
- **Logic input (IN) 3.3V capability**
- **Space saving SOT23-5L package**
- **Extended temperature range: -40°C to +125°C**

Description

The TF0215/16 high speed, low side MOSFET and IGBT drivers are capable of driving 1.9A of peak current. The TF0215/16 logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) to interface easily with MCUs. Internal undervoltage lockout (UVLO) will protect MOSFET with loss of supply by turning off the output when V_{CC} falls below operating range. 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 ground pin without damage. Also they can accept 500mA of reverse current forced back into its outputs without damage or logic change. The TF0215 provides an inverted output and the TF0216 provides a noninverting output. The TF0215/16 comes in a space-saving SOT23-5L package and it operates over an extended -40 °C to +125 °C temperature range.

Applications

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

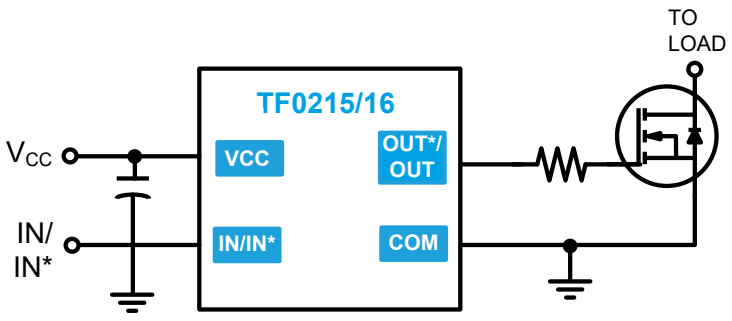
SOT-23-5L

Ordering Information

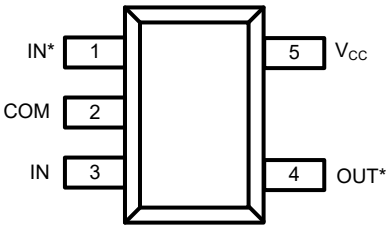
Year Year Week Week

PART NUMBER	PACKAGE	PACK / Qty	MARK
TF0215-USQ	SOT-23-5L	T&R / 3,000	T0215/16 YYWW
TF0216-USQ	SOT-23-5L	T&R / 3,000	

Typical Application

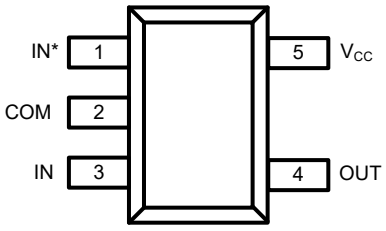


Pin Diagrams



TF0215

Top View: SOT23-5L

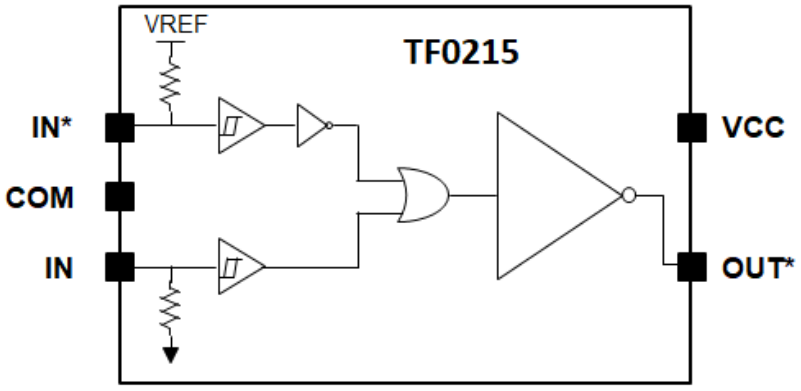


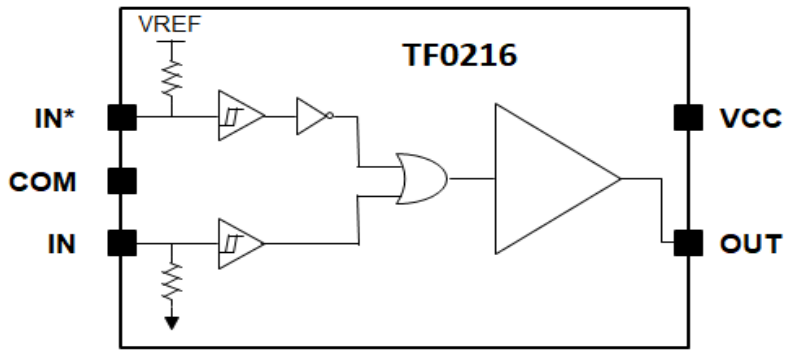
TF0216

Pin Descriptions

PIN NAME	PIN NUMBER	PIN DESCRIPTION
IN*	1	Logic input, in phase with OUT* (TF0215), out of phase with OUT (TF0216), leave open when not in use.
COM	2	Supply return
IN	3	Logic input, out of phase with OUT* (TF0215), in phase with OUT (TF0216), leave open when not in use.
OUT*/OUT	4	Gate drive output
V_{CC}	5	Supply input

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).....-5V to V_{CC} +0.3V
ESD Protection on all pins.....2kV (HBM)
400V (MM)

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.*

P_D - Package power dissipation at $T_A \leq 25$ °C
SOT23-5L.....TBD
SOT23-5L Thermal Resistance ***(NOTE2)***
θ_{JA}.....TBD °C/W
θ_{JC}.....TBD °C/W

T_J - Junction operating temperature.....+150 °C
T_L - Lead Temperature (soldering, 10 seconds).....+300 °C
T_{stg} - Storage temerature .....-55 to 150 °C

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)	0	5	V
T_A	Ambient temperature	-40	125	°C

Electrical Characteristics *(NOTE3)*

V_{BIAS} (4.5V<V_{CC}<18V), T_A = 25 °C , unless otherwise specified.

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
DC Characteristics						
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	µA
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	µA
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} = 10mA, V_{CC} = 12V		3.3		Ω
R_{OL}	Output Resistance, Low	I_{OUT} = 10mA, V_{CC} = 12V		2.3		Ω
Switching Characteristics						
t_r	Turn-on rise time	C_L = 1000pF, V_{CC} = 12V		15	25	ns
t_f	Turn-off fall time	C_L = 1000pF, V_{CC} = 12V		15	25	ns
t_{on}	Turn-on propogation delay	V_{CC} = 12V		35	50	ns
t_{off}	Turn-off propogation delay	V_{CC} = 12V		35	55	ns

NOTE3 *The V_{IN} and I_{IN} parameters are applicable to the logic input pin: IN. The V_0 and I_0 parameters are applicable to the output pins: OUT and OUT**

Electrical Characteristics (over operating temperature range)

V_{BIAS} (4.5V<V_{CC}<18V), -40°C < T_C<125 °C , unless otherwise specified.

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
DC Characteristics						
V_{IH}	Logic "1" input voltage		2.4			V
V_{IL}	Logic "0" input voltage				0.8	
I_{IN+}	Logic "1" input bias current	V_{IN} = 3V			10	µA
I_{IN-}	Logic "0" input bias current	V_{IN} = 0V		0	5	
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		0.1	0.2	mA
R_{OH}	Output Resistance, High	I_{OUT} = 10mA, V_{CC} = 12V			10	Ω
R_{OL}	Output Resistance, Low	I_{OUT} = 10mA, V_{CC} = 12V			7	Ω
Switching Characteristics						
t_r	Turn-on rise time	C_L = 1000pF, V_{CC} = 12V		30	40	ns
t_f	Turn-off fall time	C_L = 1000pF, V_{CC} = 12V		30	40	ns
t_{on}	Turn-on propogation delay	V_{CC} = 12V		45	55	ns
t_{off}	Turn-off propogation delay	V_{CC} = 12V		50	60	ns

Timing Waveforms

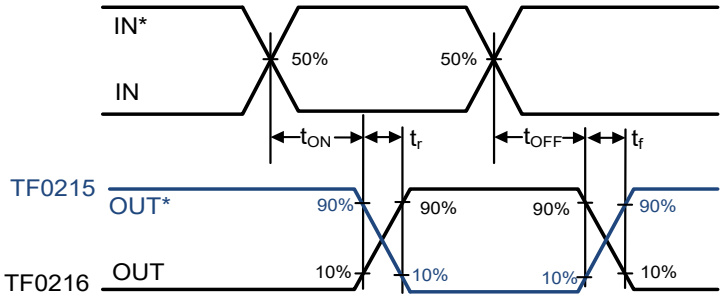


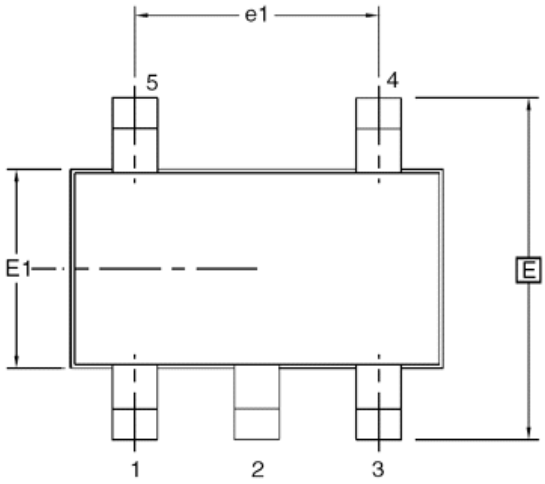
Figure 1. Switching Time Waveform Definitions

Input/Output response table

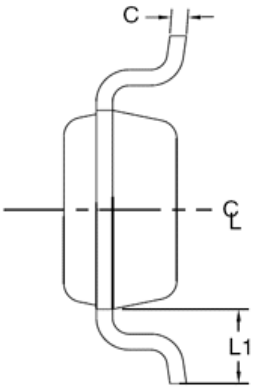
Input pin	Input logic	TF0215 (OUT*)	TF0216 (OUT)
IN	H	L	H
IN	L	H	L
IN*	H	H	L
IN*	L	L	H

Package Dimensions (SOT23-5L)

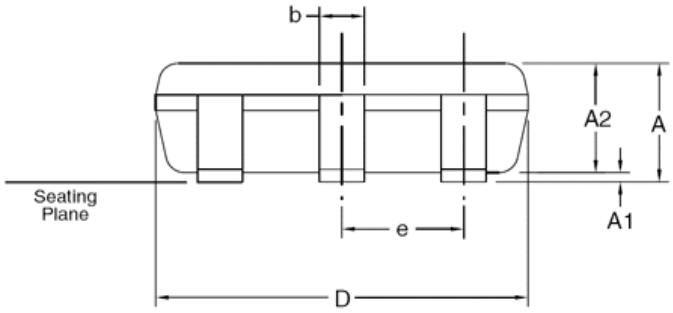
Please contact support@tfsemi.com for package availability.



Top View



End View



Side View

COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	–	–	1.10	
A1	0.00	–	0.10	
A2	0.70	0.90	1.00	
c	0.08	–	0.20	4
D	2.90 BSC			2, 3
E	2.80 BSC			2, 3
E1	1.60 BSC			2, 3
L1	0.60 REF			
e	0.95 BSC			
e1	1.90 BSC			
b	0.30	–	0.50	4, 5

Revision History

Rev.	Change	Owner	Date
1.0	First release	Keith Spaulding	6/21/2017
1.1	Specs adjusted from pre production testing	Keith Spaulding	2/8/2018
1.2	Add Order Information	Duke Walton	12/15/2020

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