



SANYO Semiconductors  
**DATA SHEET**

# TND509MD

ExPD(Excellent Power Device)

**General-Purpose Driver for Applications Including PDP Sustain Pulse Drive, DC / AC Motor Drive, Ballast, Battery Charger, High Frequency Switching Power Supply, Induction Heating, and Switching Amplifiers**

## Features

- Monolithic structure.
- Allows simplified configuration of driver circuit.
- Withstand voltage of 600V is assured.
- Shutdown protection function.
- Fully compatible input to LSTTL/CMOS.
- High-speed switching (120ns at 1000pF load).
- Propagation delay is about 150ns.
- Output current : 220mA Source, 450mA Sink.

## Specifications

**Absolute Maximum Ratings** at Ta=25°C (All voltage parameters are absolute voltage referenced to GND)

Parameter	Symbol	Conditions	Ratings	Unit
High Side Floating Supply Voltage	V <sub>H</sub>		-0.3 to 625	V
High Side Floating Supply Offset Voltage	V <sub>HFG</sub>		V <sub>H</sub> -25 to V <sub>H</sub> +0.3	V
High Side Output Voltage	V <sub>HOUT</sub>		V <sub>HFG</sub> -0.3 to V <sub>H</sub> +0.3	V
Low Side Supply Voltage	V <sub>L</sub>		-0.3 to 25	V
Low Side Output Voltage	V <sub>LOUT</sub>		-0.3 to V <sub>L</sub> +0.3	V
Logic Supply Voltage	V <sub>DD</sub>		-0.3 to 25	V
Logic Input Voltage(HIN, LIN, SD)	V <sub>IN</sub>		-0.3 to V <sub>DD</sub> +0.3	V
Allowable Power Dissipation	P <sub>D</sub>	Mounted on a ceramic board	0.9	W
Junction Temperature	T <sub>J</sub>		-55 to +150	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

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13107 TI IM TC-00000479 / D2805 MS IM TB-00001992 / 21505IP TS IM TB-00001106 No.8204-1/10

## TND509MD

### Recommended Operating Conditions at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
High Side Floating Supply Voltage	V <sub>H</sub>		V <sub>HFG</sub> +10 to V <sub>HFG</sub> +20	V
High Side Floating Supply Offset Voltage	V <sub>HFG</sub>		0 to 600	V
High Side Output Voltage	V <sub>HOUT</sub>		V <sub>HFG</sub> to V <sub>H</sub>	V
Low Side Supply Voltage	V <sub>L</sub>		10 to +20	V
Low Side Output Voltage	V <sub>LOUT</sub>		0 to V <sub>L</sub>	V
Logic Supply Voltage	V <sub>DD</sub>		+5 to +20	V
Logic Input Voltage(HIN, LIN, SD)	V <sub>IN</sub>		0 to V <sub>DD</sub>	V
Ambient Temperature	Topr		-40 to +125	°C

### AC Characteristics at Ta=25°C (V<sub>DD</sub>=V<sub>L</sub>=V<sub>HFG</sub>=15V, C<sub>L</sub>=1000pF)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Turn-ON Delay Time	t <sub>on</sub>	V <sub>HFG</sub> =0V		150		ns
Turn-OFF Delay Time	t <sub>off</sub>	V <sub>HFG</sub> =600V		120		ns
Shutdown Delay Time	t <sub>sd</sub>	V <sub>HFG</sub> =600V		120		ns
Turn-ON Rise Time	t <sub>r</sub>			120		ns
Turn-OFF Fall Time	t <sub>f</sub>			60		ns
Delay Matching, HS and LS Turn-ON	M <sub>ton</sub>	H <sub>ton</sub> -L <sub>ton</sub>		15		ns
Delay Matching, HS and LS Turn-OFF	M <sub>toff</sub>	H <sub>toff</sub> -L <sub>toff</sub>		15		ns

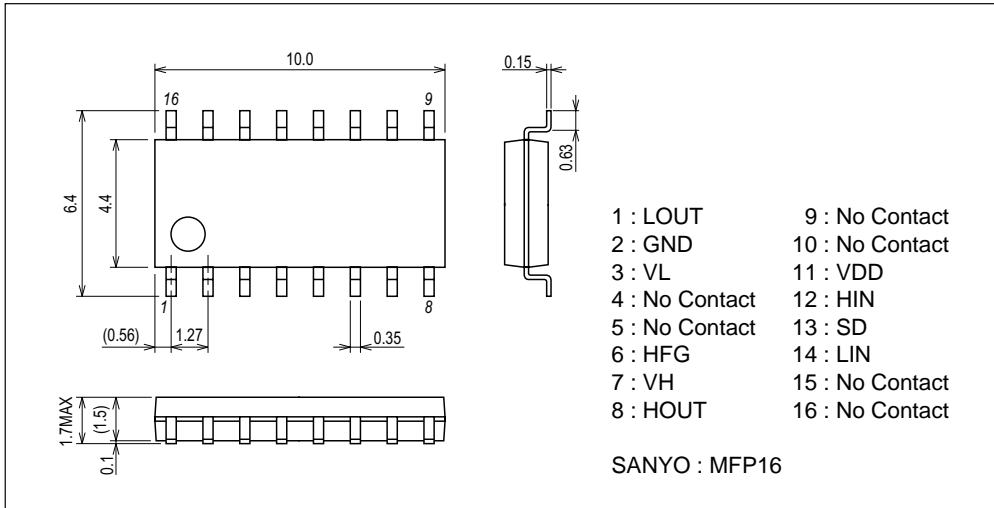
### DC Characteristics at Ta=25°C (V<sub>DD</sub>=V<sub>L</sub>=V<sub>HFG</sub>=15V)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Logic "1" Input Voltage	V <sub>IH</sub>	V <sub>DD</sub> =5V	3.2			V
		V <sub>DD</sub> =10V	6.4			V
		V <sub>DD</sub> =15V	9.5			V
		V <sub>DD</sub> =20V	12.8			V
Logic "0" Input Voltage	V <sub>IL</sub>	V <sub>DD</sub> =5V			1.5	V
		V <sub>DD</sub> =10V			3.7	V
		V <sub>DD</sub> =15V			5.8	V
		V <sub>DD</sub> =20V			7.7	V
High-level Output Voltage, V <sub>BIAS</sub> -V <sub>O</sub>	V <sub>OH</sub>	V <sub>IN</sub> =V <sub>IH</sub> , I <sub>O</sub> =0A			0.1	V
Low-level Output Voltage, V <sub>O</sub>	V <sub>OL</sub>	V <sub>IN</sub> =V <sub>IL</sub> , I <sub>O</sub> =0A			0.1	V
Offset Supply Leakage Current	I <sub>LK</sub>	V <sub>H</sub> =V <sub>HFG</sub> =600V			10	μA
Quiescent V <sub>H</sub> Supply Current	I <sub>QH</sub>	V <sub>IN</sub> =0V or V <sub>DD</sub>		35	60	μA
Quiescent V <sub>L</sub> Supply Current	I <sub>QL</sub>	V <sub>IN</sub> =0V or V <sub>DD</sub>		120	200	μA
Quiescent V <sub>DD</sub> Supply Current	I <sub>QDD</sub>	V <sub>IN</sub> =0V or V <sub>DD</sub>		5	20	μA
Logic "1" Input Bias Current	I <sub>IN+</sub>	V <sub>IN</sub> =V <sub>DD</sub>		20	55	μA
Logic "0" Input Bias Current	I <sub>IN-</sub>	V <sub>IN</sub> =0V			1	μA
V <sub>H</sub> Supply Undervoltage Positive Going Threshold	V <sub>HUV+</sub>		7.6	8.9	9.9	V
V <sub>H</sub> Supply Undervoltage Negative Going Threshold	V <sub>HUV-</sub>		6.7	8.1	9.5	V
V <sub>L</sub> Supply Undervoltage Positive Going Threshold	V <sub>LUV+</sub>		7.6	8.9	9.9	V
V <sub>L</sub> Supply Undervoltage Negative Going Threshold	V <sub>LUV-</sub>		6.7	8.1	9.5	V
Output High Short Circuit Pulsed Current	I <sub>O+</sub>	V <sub>OUT</sub> =0V, V <sub>IN</sub> =15V, PW≤10μs	220	250		mA
Output Low Short Circuit Pulsed Current	I <sub>O-</sub>	V <sub>OUT</sub> =15V, V <sub>IN</sub> =0V, PW≤10μs	450	500		mA

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## Package Dimensions

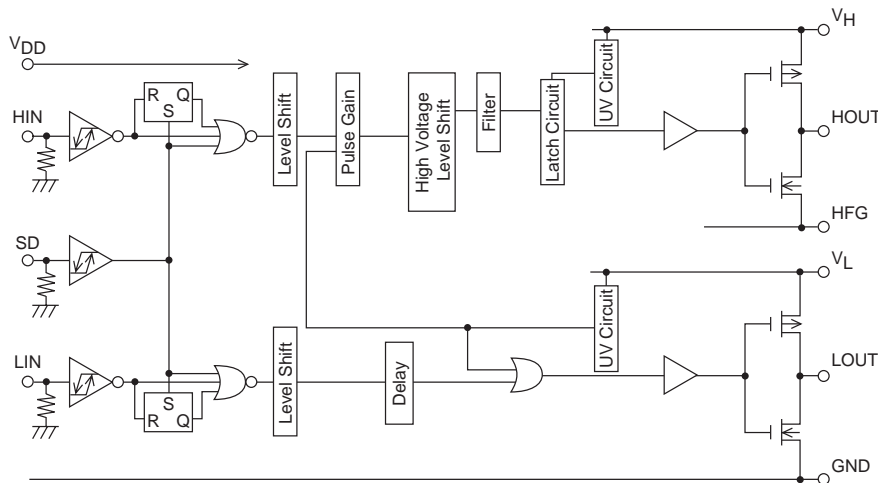
unit : mm (typ)  
7050A-001



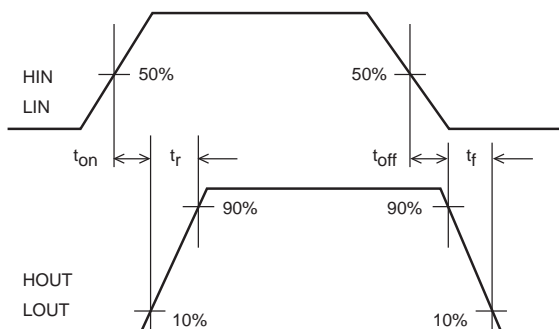
## Sequence of supply voltage

High Side Floating Supply Voltage  $V_H$  should be inputted after Low Side Supply Voltage  $V_L$  is inputted.

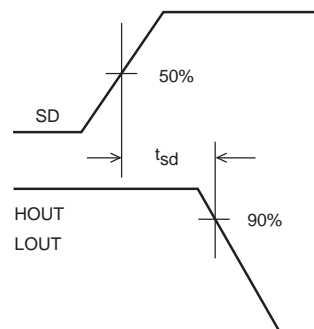
## Functional Block Diagram



## Switching Time Waveform Definition

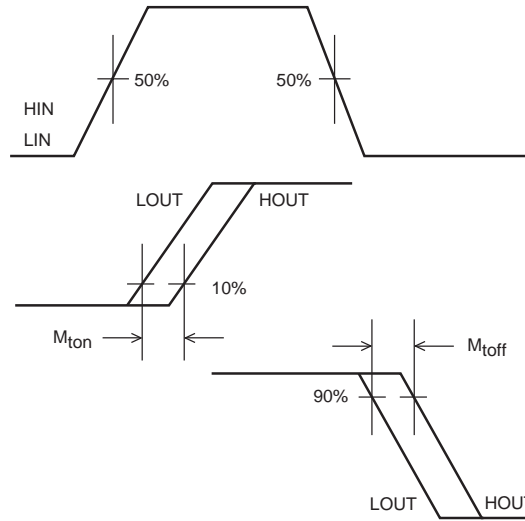


## Shutdown Waveform Definition

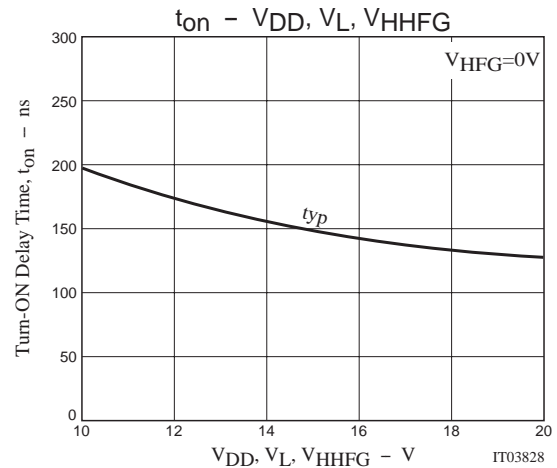
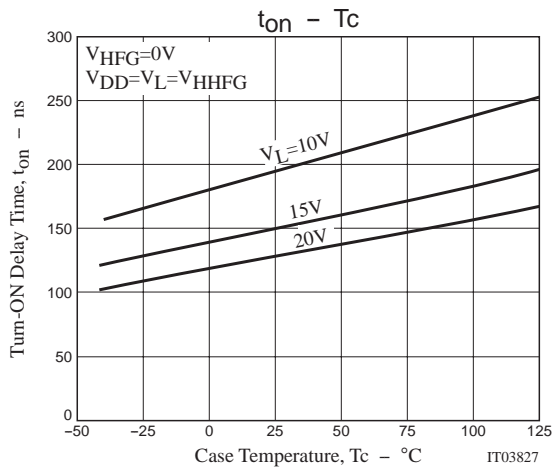
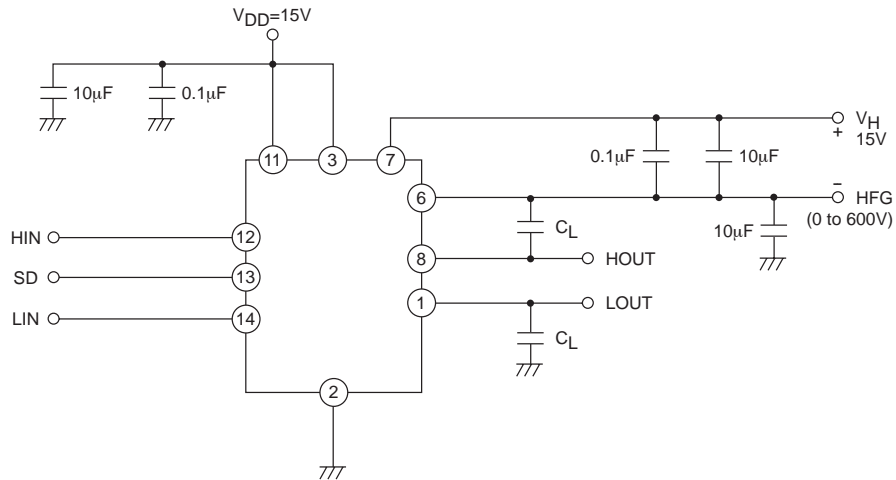


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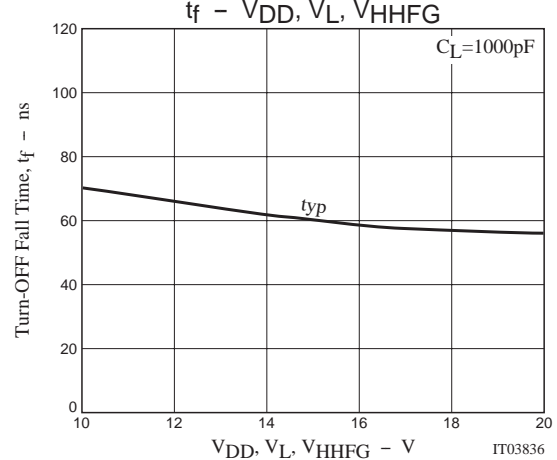
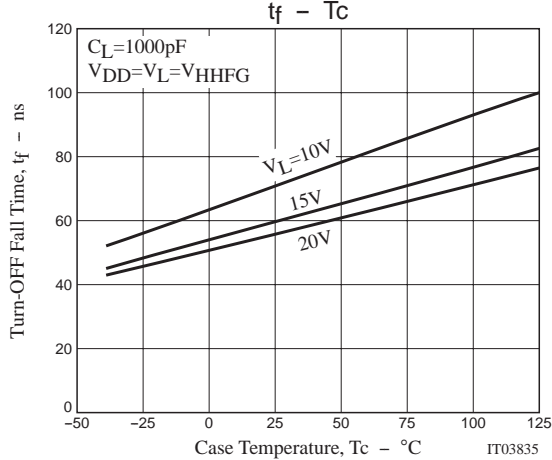
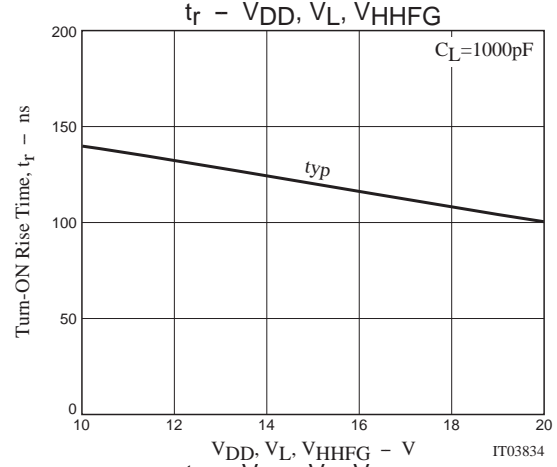
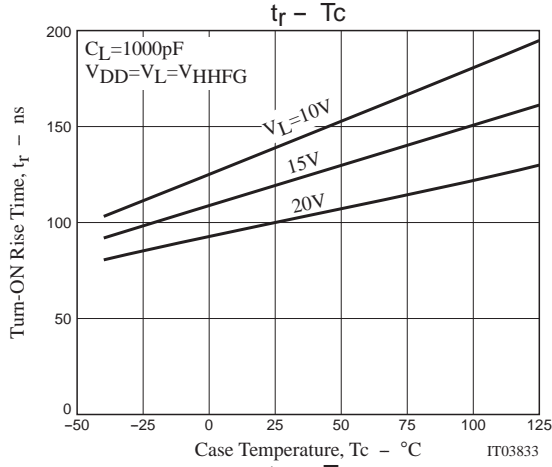
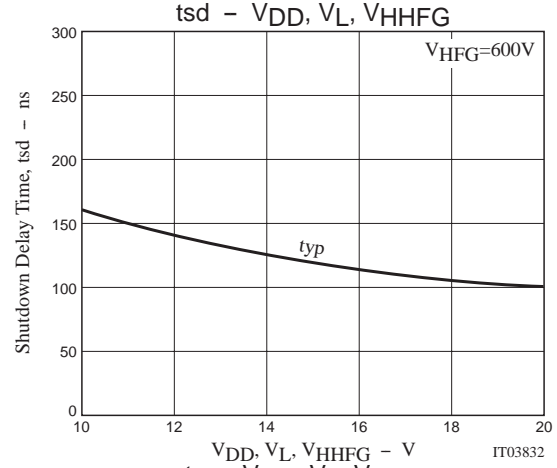
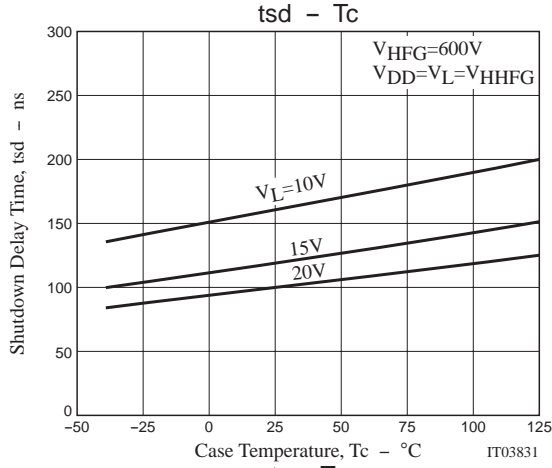
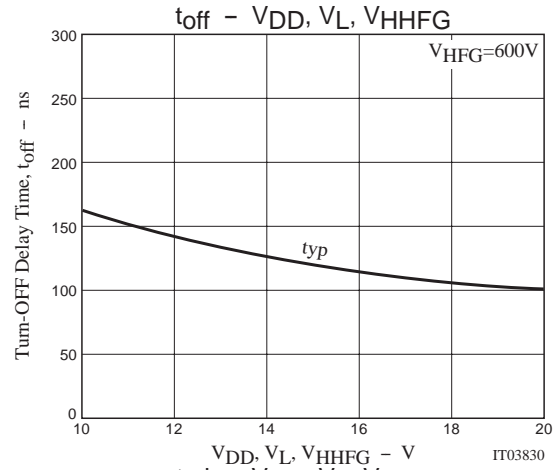
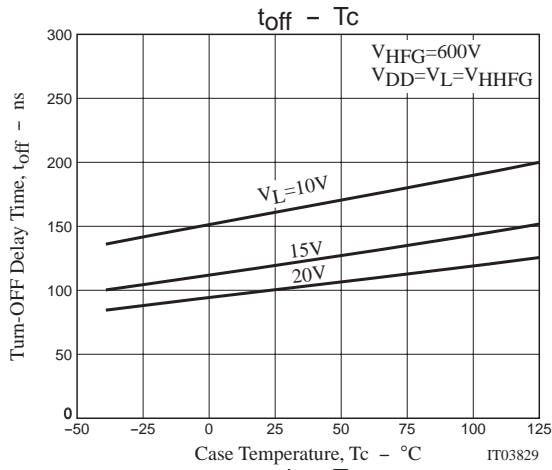
## Delay Matching Waveform Definition



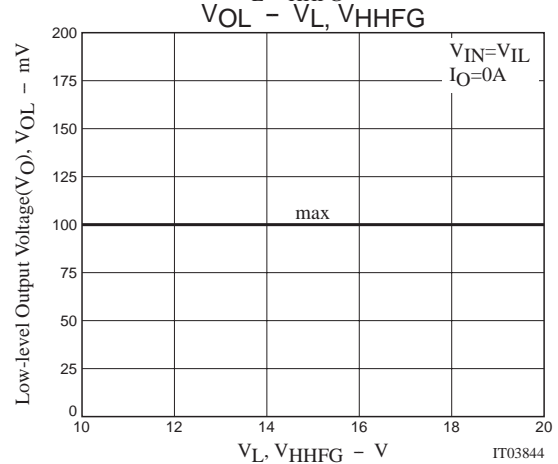
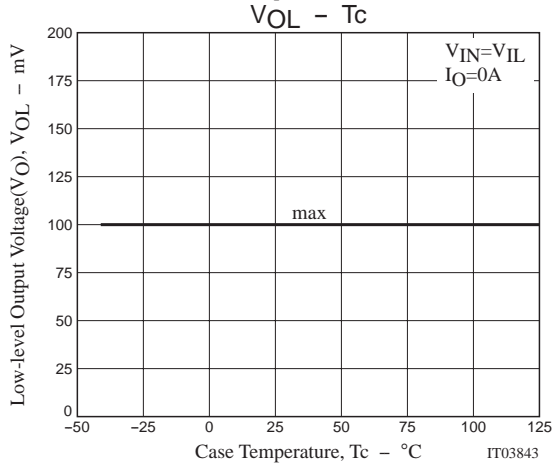
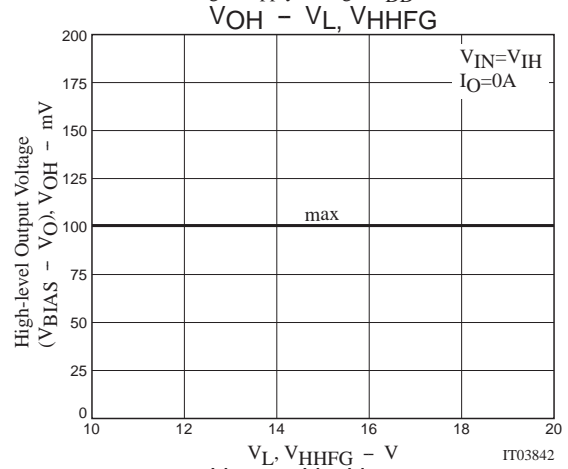
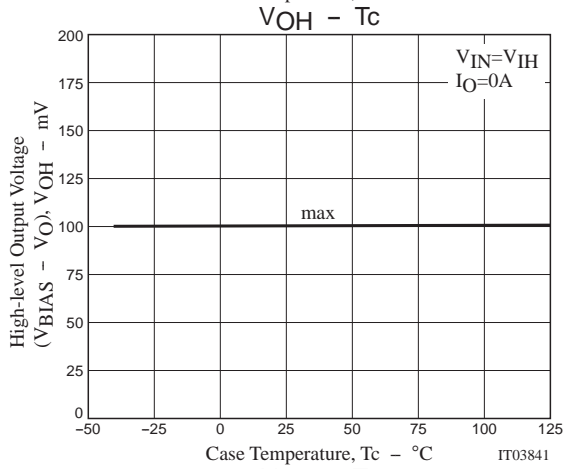
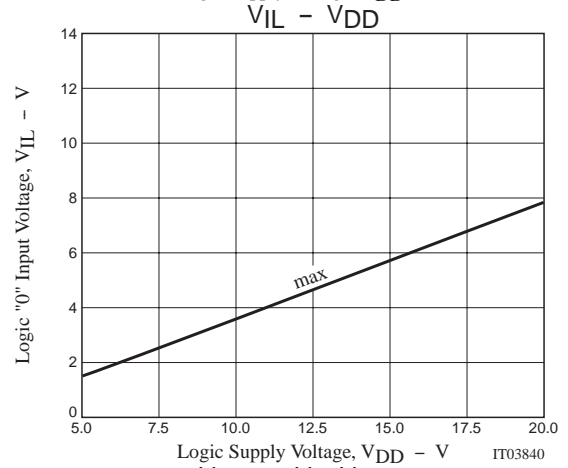
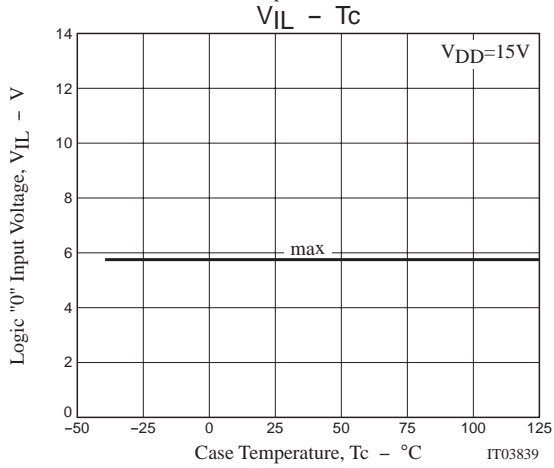
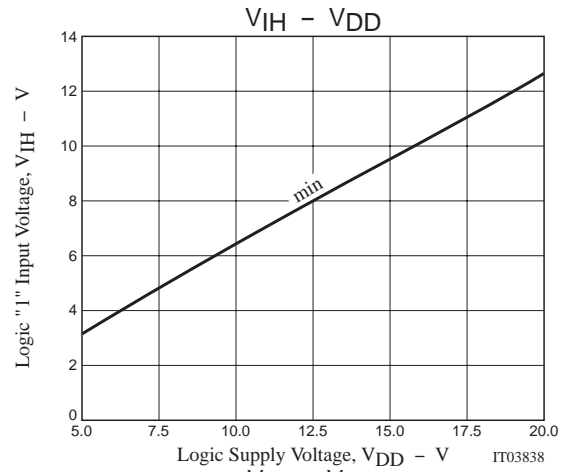
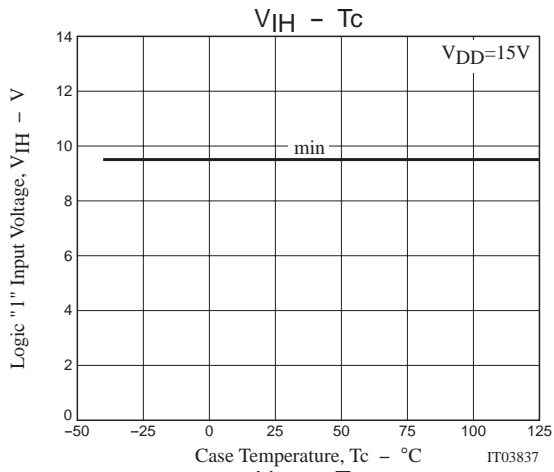
## Switching Time Test Circuit



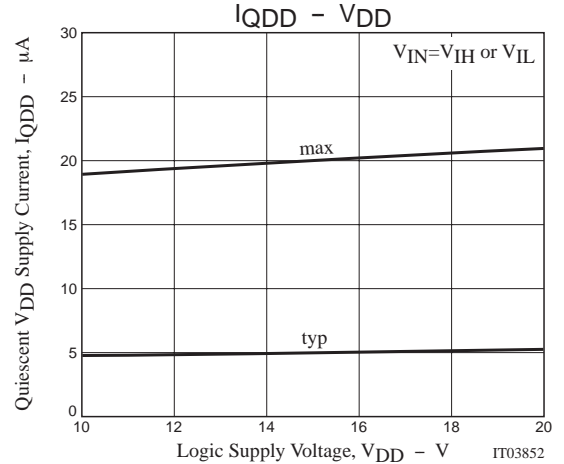
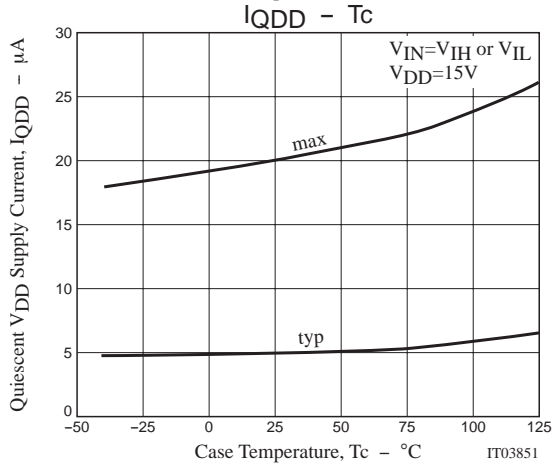
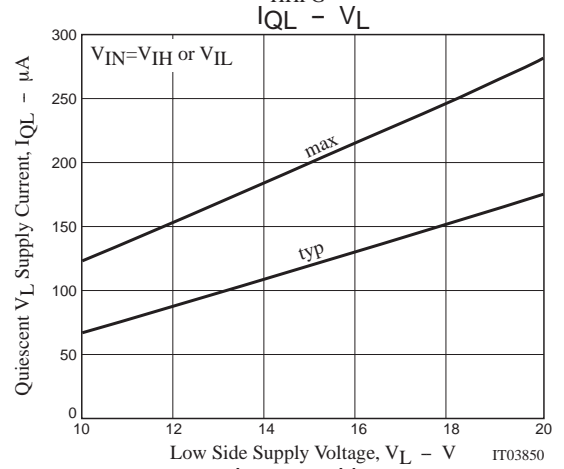
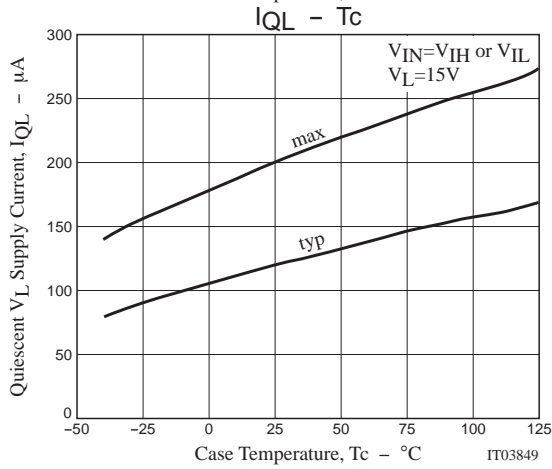
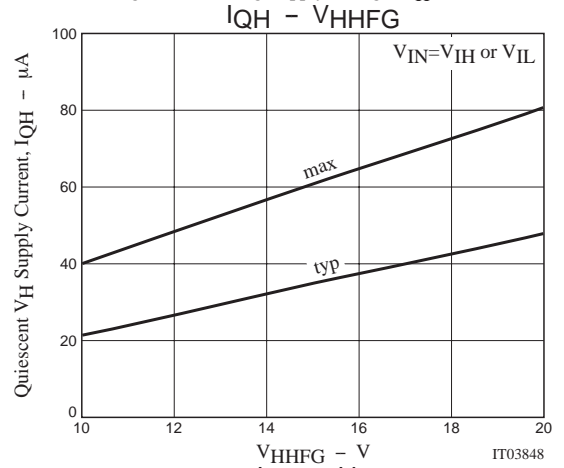
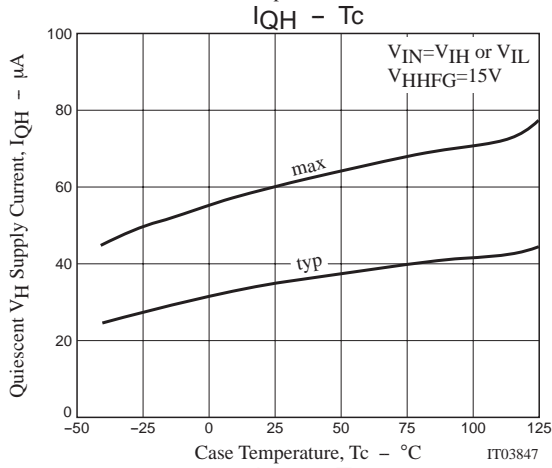
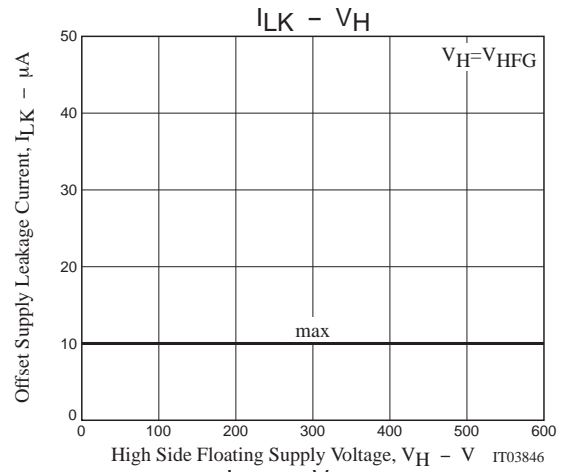
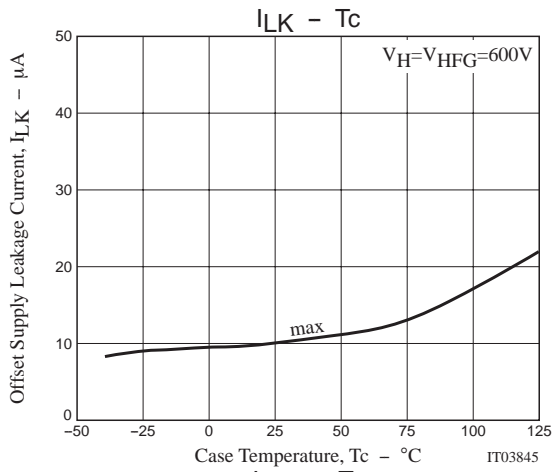
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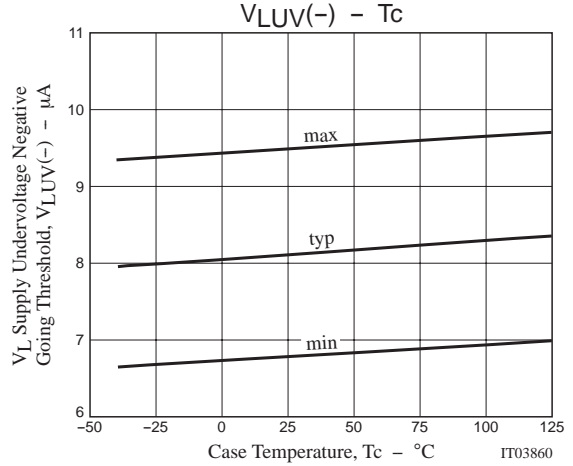
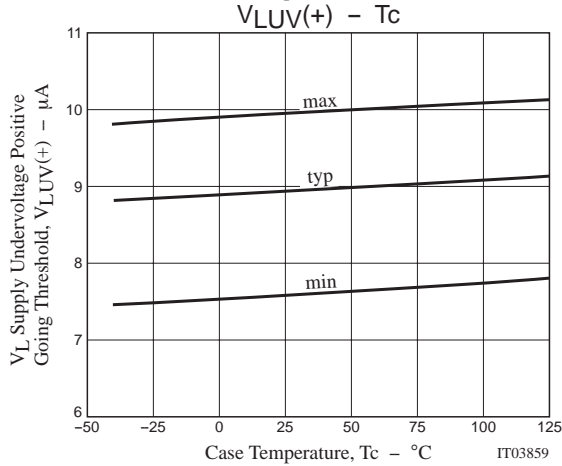
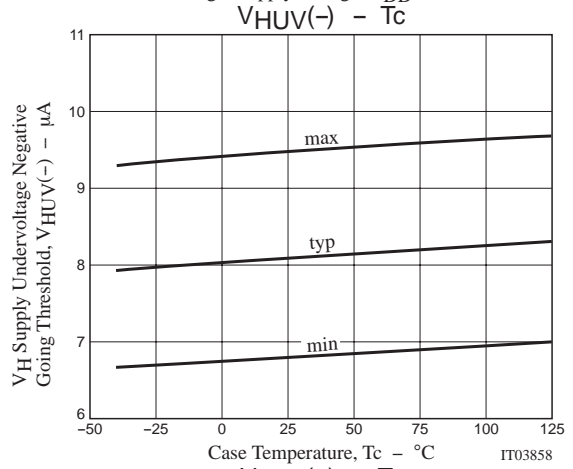
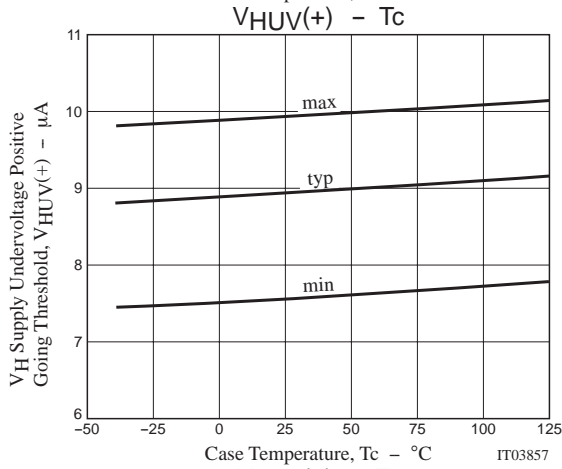
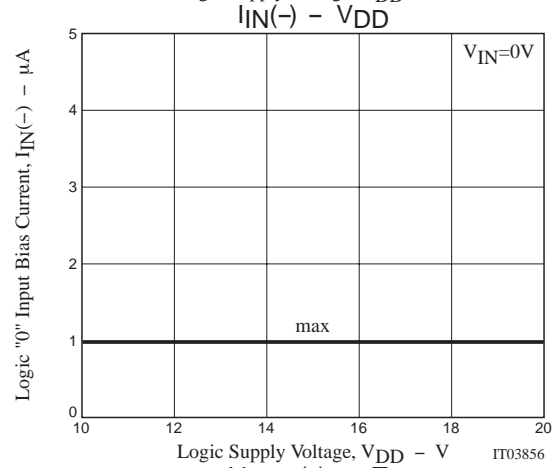
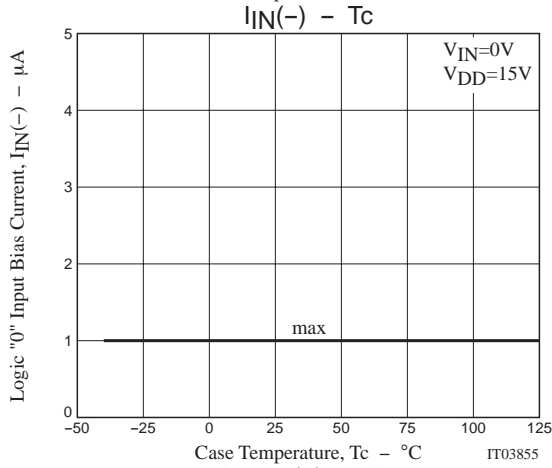
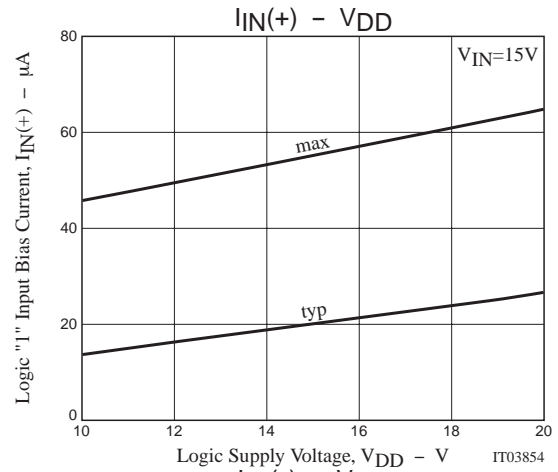
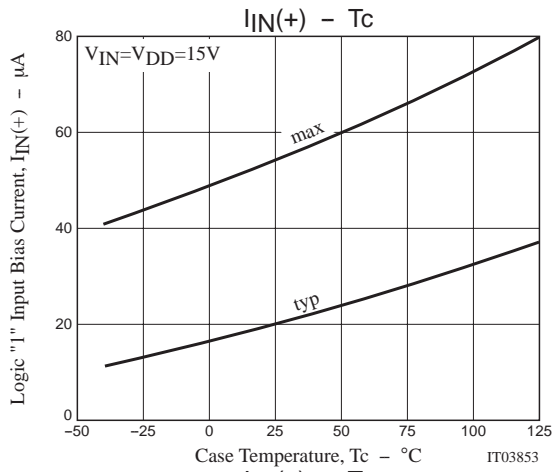
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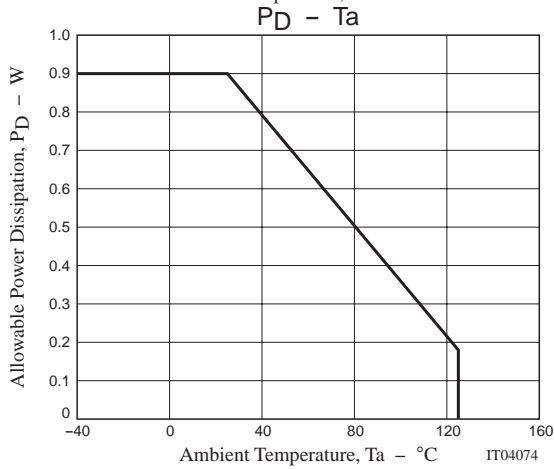
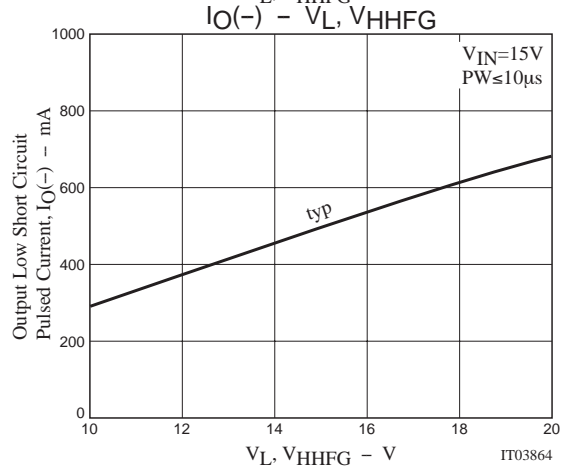
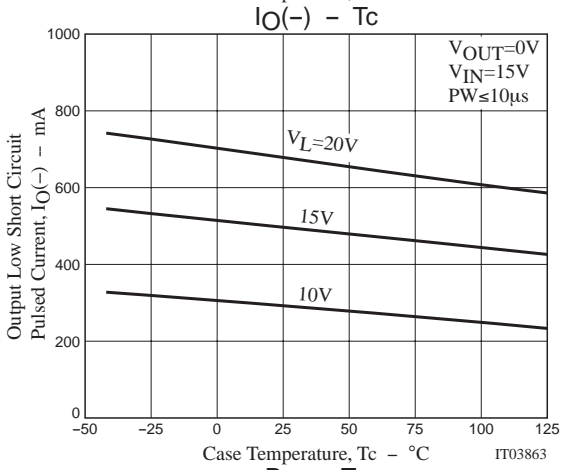
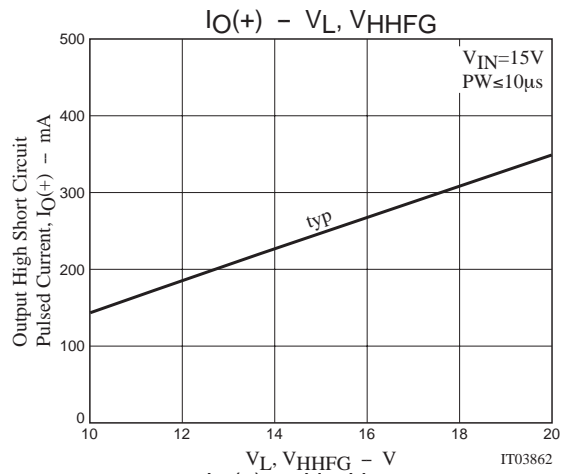
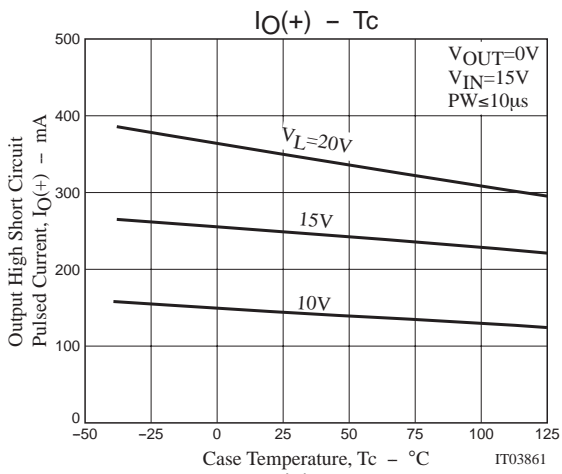


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