600V HALF-BRIDGE GATE DRIVER

Features

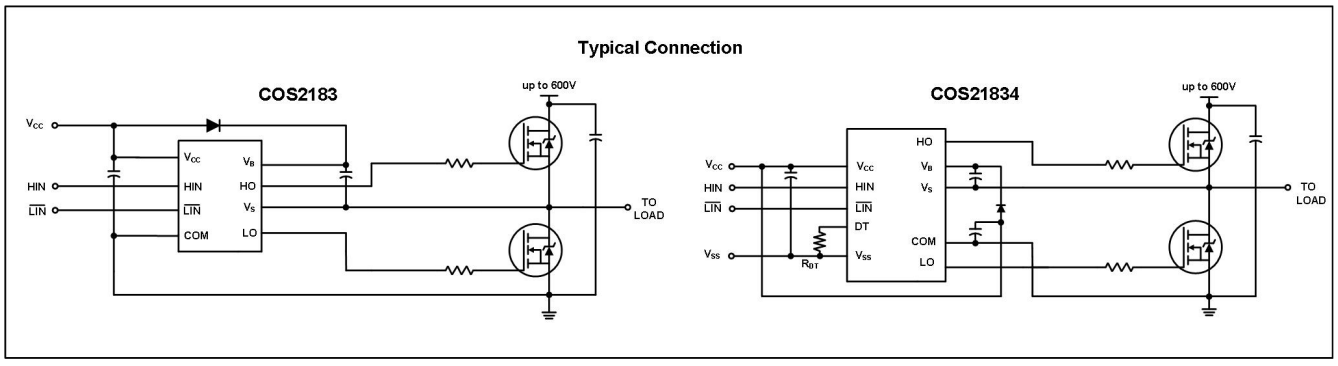
- High side fully operational to +600V
- Floating channel designed for bootstrap operation
- Output source/sink current capability 2.5A
- Gate drive supply range from 10V to 20V
- Common-mode dv/dt noise canceling circuit
- Under-voltage lockout for both channels
- 3.3V and 5V input logic compatible
- Logic and power ground ±5V offset
- CMOS Schmitt-triggered inputs with pull-down
- Cross-conduction prevention logic
- Matched propagation delay for both channels

Applications

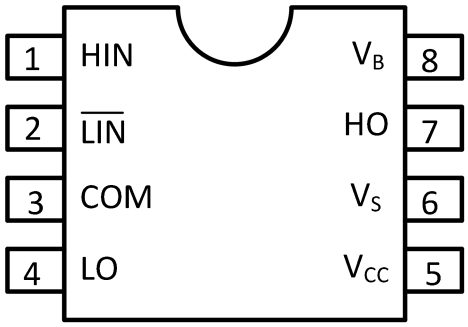
- Motor Drivers
- Full/Half Bridge Converters
- Two Switch forward Converter

General Description

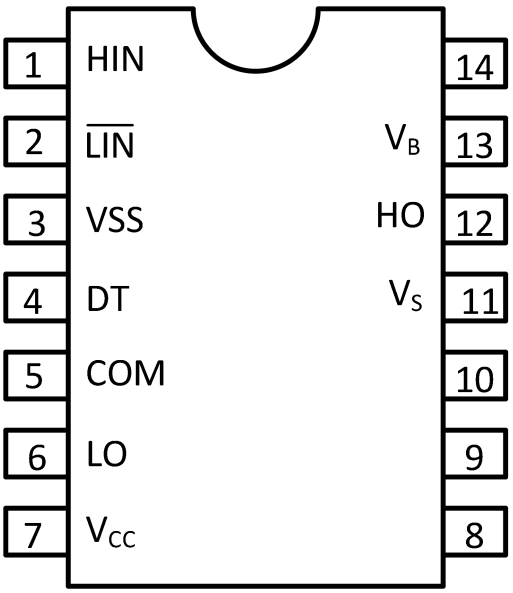
The COS2183/COS21834 are high voltage, high speed half-bridge power MOSFET and IGBT drivers with dependent high and low side referenced output channels. The output drivers feature a high pulse current buffer stage designed for minimum driver cross conduction. Propagation delays are matched to simplify use in high frequency applications. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high-side configuration which operates up to 600V. The Logic inputs of COS2183/COS21834 are compatible with standard CMOS or TTL output, down to 3.3V logic. COS2183 is available in Green SOP8 and DIP8 Packages. COS21834 is available in Green SOP14 and DIP14 Packages.



1. Pin Configuration and Functions



COS2183
DIP-8/SOP-8



COS21834
SOP-14

Figure 1. Pin Diagram

Pin Description

Pin Name	Pin No. (COS2183)	Pin No. (COS21834)	Description
HIN	1	1	Logic input for high side gate driver outputs (HO), in phase with HO (referenced to COM for COS2183 and VSS for COS21834)
$\overline{LIN}$	2	2	Logic input for low side gate driver outputs (LO), out of phase with LO (referenced to COM for COS2183 and VSS for COS21834)
VSS	-	3	Logic ground (COS21834 only)
COM	3	5	Low-side return
LO	4	6	Low-side gate drive output
VCC	5	7	Low-side and logic fixed supply
VS	6	11	High-side floating supply return
HO	7	12	High-side gate drive output
VB	8	13	High-side floating supply
DT	-	4	Programmable deadtime lead, referenced to VSS (COS21834 only)

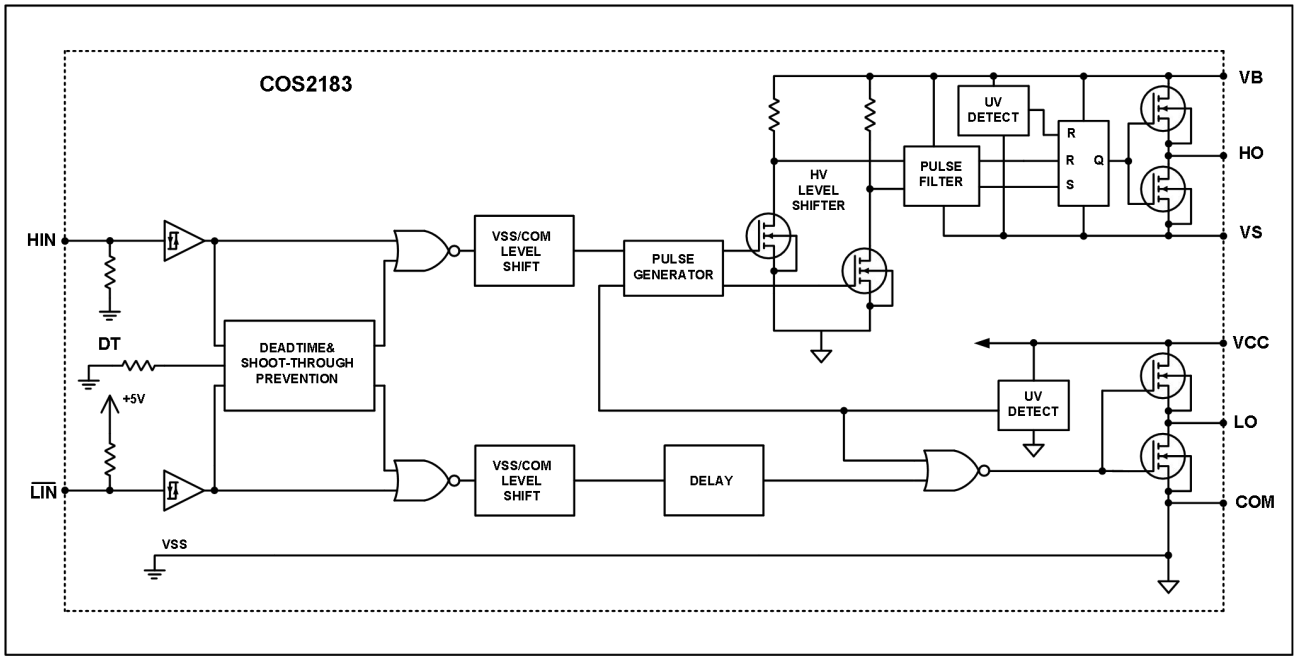


Figure 2. Functional Block Diagram of COS2183

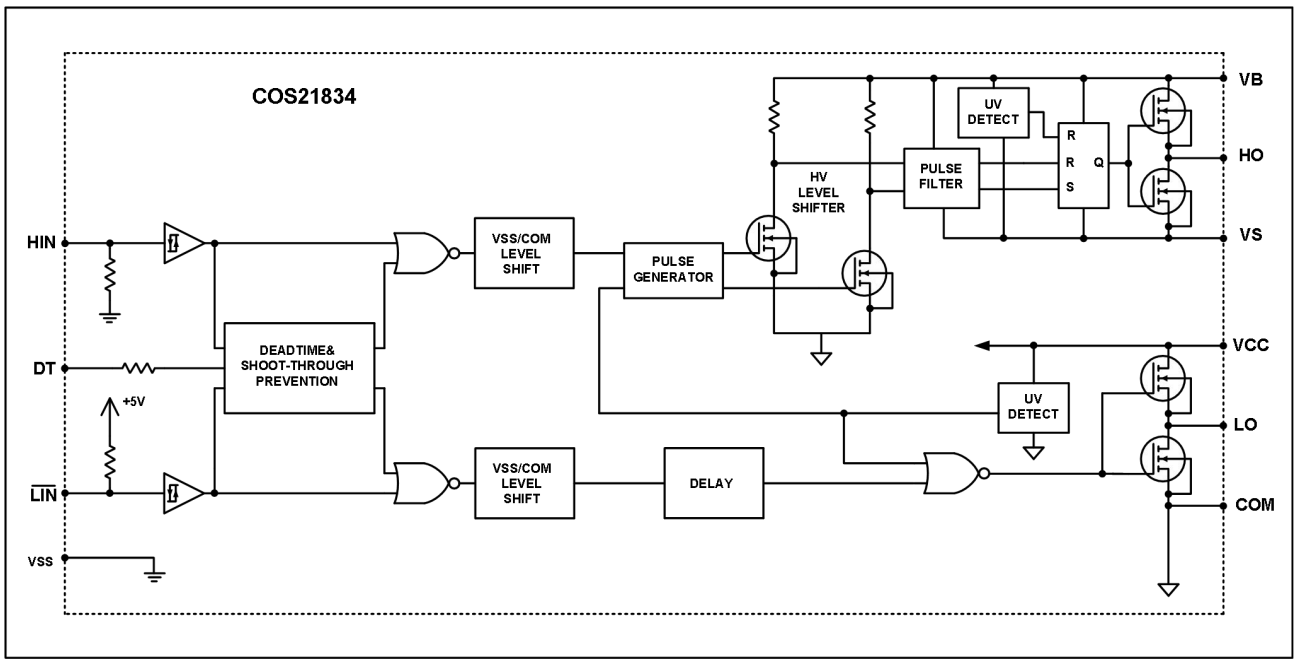


Figure 3. Functional Block Diagram of COS21834

2. Product Specification

2.1 Absolute Maximum Ratings (1)

Parameter	Symbol	Min	Max	Unit
High-side floating supply voltage	VB	-0.3	625	V
High-side floating supply offset voltage	VS	VB - 25	VB +0.3	
High-side floating output voltage	VHO	VS - 0.3	VB + 0.3	
Low-side fixed supply voltage	VCC	-0.3	25	
Low-side output voltage	VLO	-0.3	VCC + 0.3	
Programmable deadtime pin voltage (COS21834 only)	DT	VSS-0.3	VCC +0.3	
Logic input voltage (HIN, LIN)	VIN	VSS-0.3	VCC +0.3	
Logic supply offset voltage (COS21834 only)	VSS	VCC-25	VSS +0.3	
Allowable offset supply voltage transient	dVs/dt	-	50	V/ns
Junction temperature	TJ	-	150	°C
Storage temperature	TS	- 50	150	
Lead temperature (soldering, 10 seconds)	TL	-	300	

(1) Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

2.2 Thermal Data

Parameter	Rating	Unit
Package Thermal Resistance, $R_{\theta JA}$ (Juntion-to-ambient)	155 (SOP8) 82 (SOP14) 125 (DIP8) 75 (DIP14)	°C/W

2.3 Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
High-side floating supply absolute voltage	VB	VS+10	VS+20	V
High-side floating supply offset voltage	VS	-5	600	
High-side floating output voltage	VHO	VS	VB	
Low-side and logic fixed supply voltage	VCC	10	20	
Low-side output voltage	VLO	0	VCC	

Logic input voltage (HIN, $\overline{SD}$)	VIN	VSS	VCC	V
Logic supply offset voltage	VSS	-5	5	
Programmable deadtime pin voltage (COS21834 only)	DT	VSS	VCC	
Operation temperature	TA	-40	125	°C

2.4 Electrical Characteristics

VBIAS (VCC, VBS) = 15 V, T_A = 25 °C , C_L =1000pF and VSS = COM, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
INPUT						
Input signal high threshold	V_{IH}		2.5	-		V
Input signal low threshold	V_{IL}			-	1.9	V
Logic “1” input bias current	I_{IN+}	V_{IN} = 5V		10	20	μA
Logic “0” input bias current	I_{IN-}	V_{IN} = 0 V		-	2.0	μA
OUTPUT						
High level output voltage, V_{BIAS}- V_O	V_{OH}	I_O=20mA		-	1.9	V
Low level output voltage	V_{OL}			-	0.15	V
Output high short circuit pulsed current	I_{O+}	V_O =0 V, V_{IN} = VCC PW≤ 10 μs	2.0	2.5	-	A
Output low short circuit pulsed current	I_{O-}	V_O =15 V, V_{IN} = 0 PW≤ 10 μs	2.0	2.5	-	A
POWER SUPPLY						
Quiescent VBS supply current	I_{QBS}	VIN = 0 V or VCC	-	38	100	μA
Quiescent VCC supply current	I_{QCC}	VIN = 0 V or VCC, DT=VSS	-	2	-	mA
Offset supply leakage current	I_{LK}	VB=VS=600V	-	-	50	μA
VCC and VBS supply under voltage positive going threshold	V_{BSUV+} V_{CCUV+}		-	8.8	-	V
VCC and VBS supply under voltage negative going threshold	V_{BSUV-} V_{CCUV-}		-	8.2	-	V
VCC and VBS supply under-voltage lockout hysteresis	V_{BSHY} V_{CCHY}		-	0.6	-	V

SWITCHING CHARACTERISTICS						
Turn-on rise time	t_R	VS=0, See Figure 7	-	25	-	ns
Turn-off fall time	t_F		-	14	-	
Turn-on propagation delay	t_{on}		-	130	-	
Turn-off propagation delay	t_{off}		-	125	-	
Delay matching, HS & LS turn-on	MT_{on}		-	0	40	
Delay matching, HS & LS turn-off	MT_{off}		-	0	30	
Deadtime (see Figure 8)	DT	RDT=0 (COS2183)	100	300	500	ns
		RDT=200kΩ (COS21834)	5	6	7	µs
Deadtime matching (see Figure 6)	MDT	RDT=0 (COS2183)	-	0	50	ns
		RDT=200kΩ (COS21834)	-	0	600	

3 Application Information

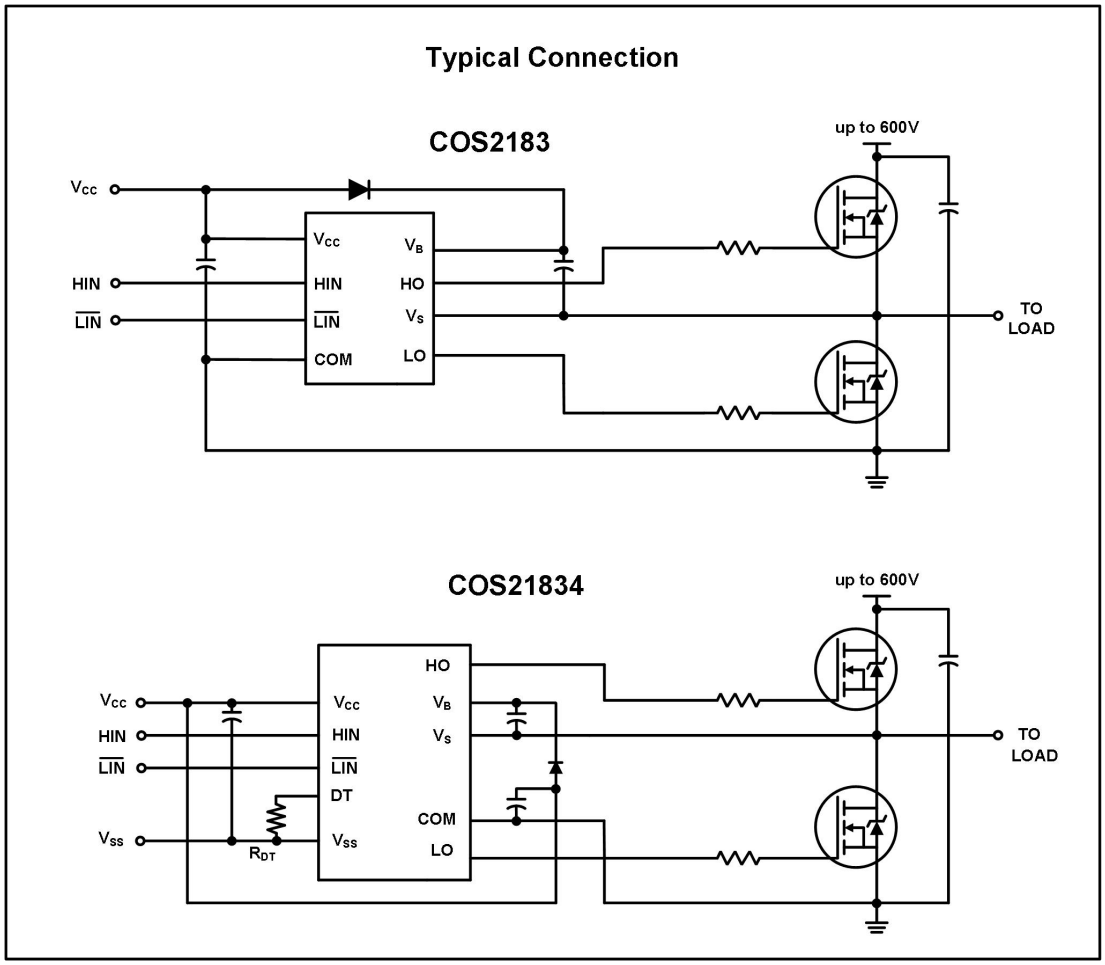


Figure 4.Typical Connection

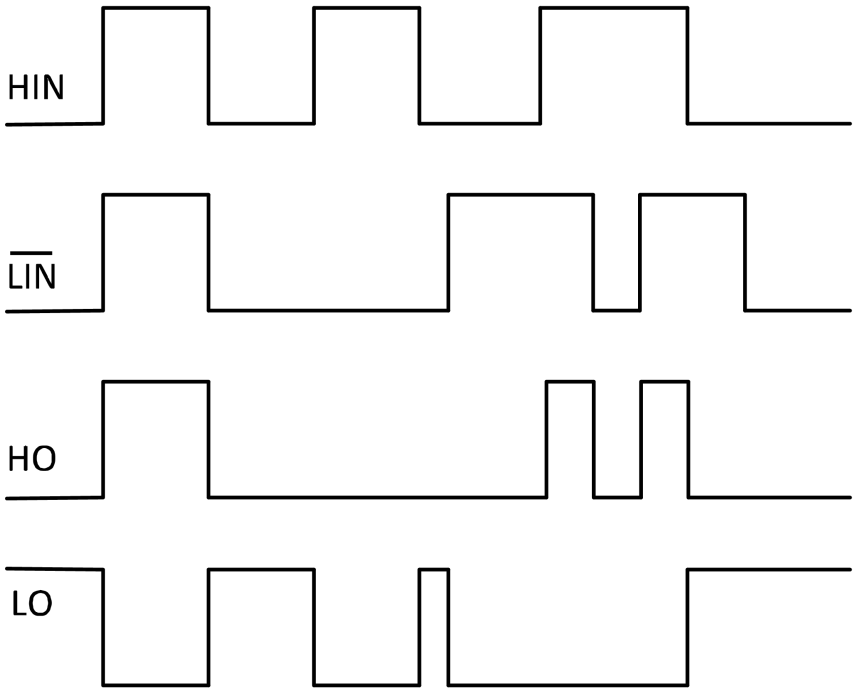


Figure 5. Input/Output Timing Diagram

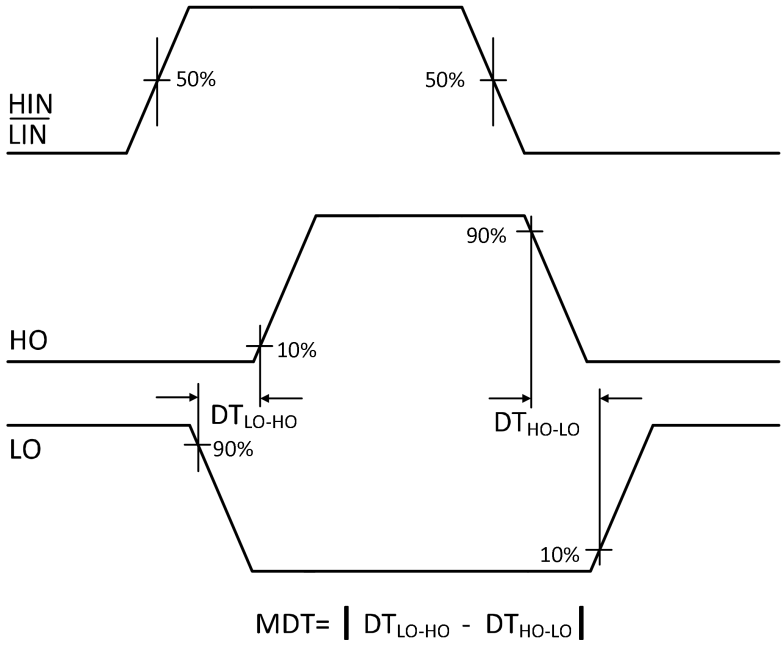


Figure 6. Deadtime Waveform Definition

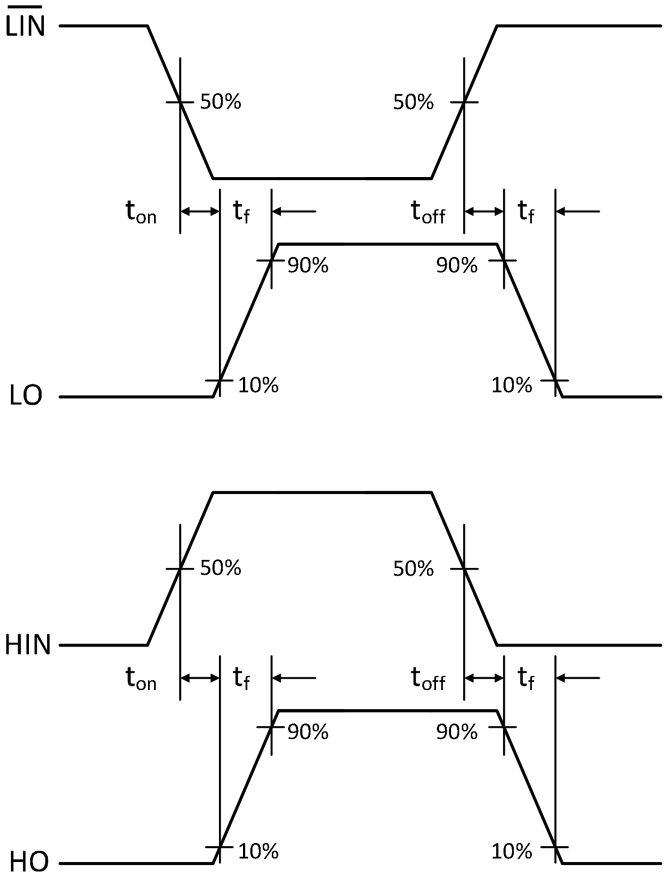


Figure 7. Switching Time Waveform Definitions

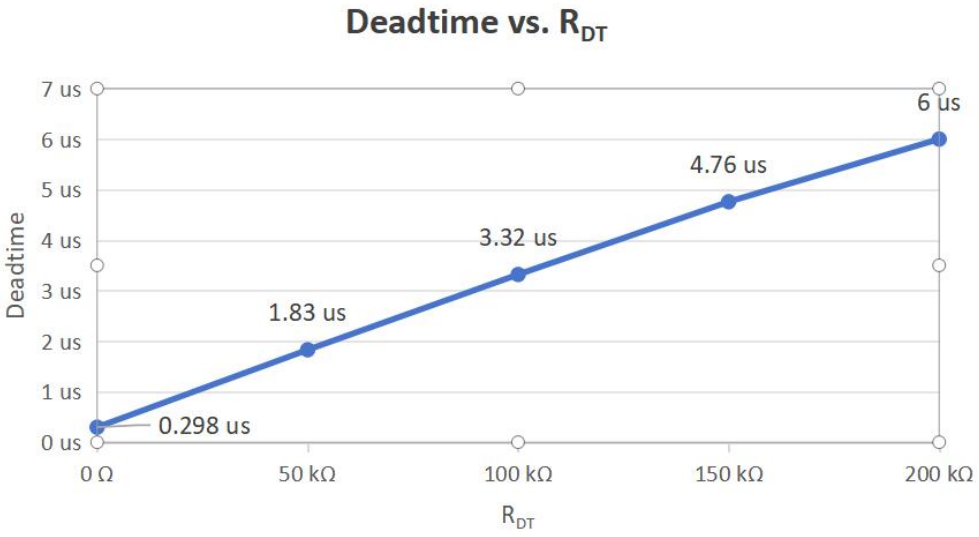
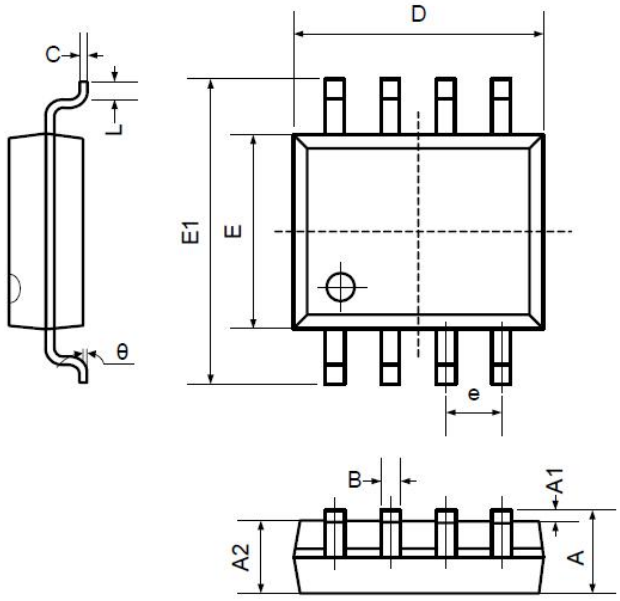


Figure 8. Deadtime vs. R_{DT}

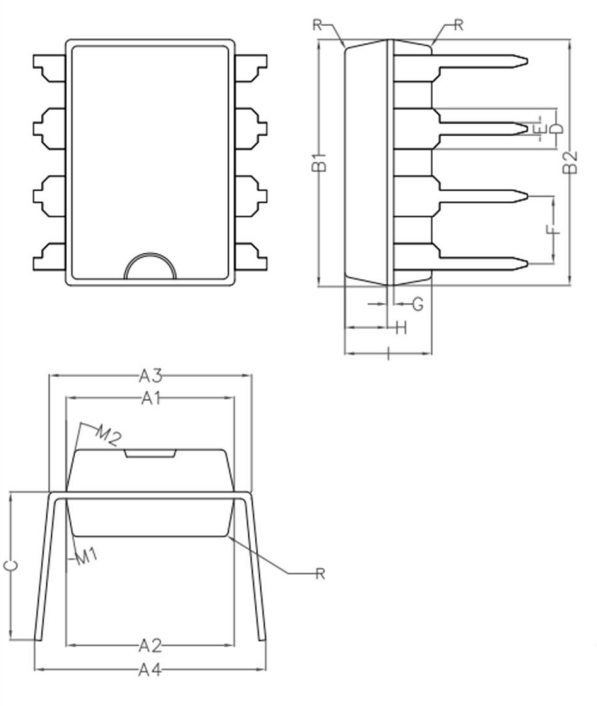
4. Package Information

4.1 SOP8 (Package Outline Dimensions)



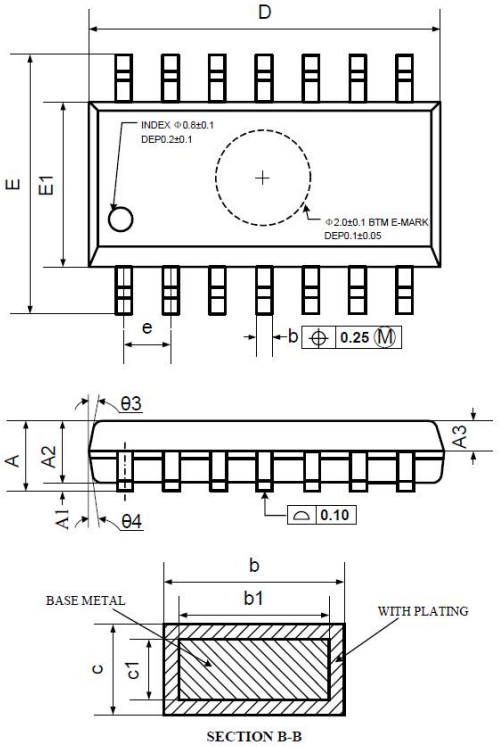
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

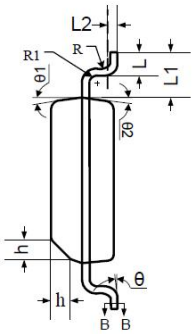
4.2 DIP8 (Package Outline Dimensions)



Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
I	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°

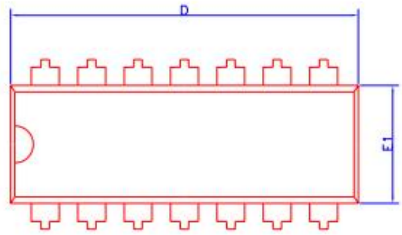
4.3 SOP14 (Package Outline Dimensions)

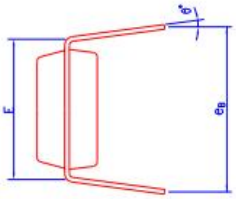


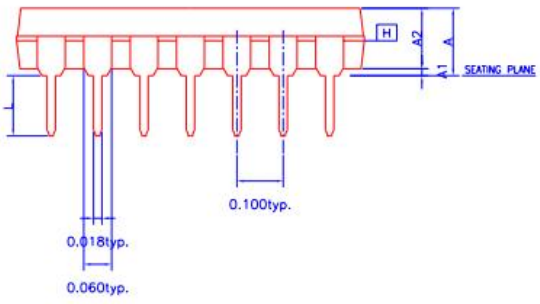


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.36		0.49
b1	0.35	0.40	0.45
c	0.16		0.25
c1	0.15	0.20	0.25
D	8.53	8.63	8.73
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07		
R1	0.07		
h	0.30	0.40	0.50
θ	0°		8°
θ1	6°	8°	10°
θ2	6°	8°	10°
θ3	5°	7°	9°
θ4	5°	7°	9°

4.4 DIP14 (Package Outline Dimensions)







SYMBOLS	MIN.	NOR.	MAX.
A	–	–	0.210
A1	0.015	–	–
A2	0.125	0.130	0.135
D	0.735	0.750	0.775
E	0.300 BSC.		
E1	0.245	0.250	0.255
L	0.115	0.130	0.150
e_B	0.335	0.355	0.375
θ°	0	7	15

UNIT : INCH

NOTES:

1. JEDEC OUTLINE : MS-001 AA
2. "D","E1" DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010 INCH.
3. eB IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
4. POINTED OR ROUNDED LEAD TIPS ARE PREFERRED TO EASE INSERTION.
5. DISTANCE BETWEEN LEADS INCLUDING DAM BAR PROTRUSIONS TO BE .005 INCH MININUM.
6. DATUM PLANE [H] COINCIDENT WITH THE BOTTOM OF LEAD, WHERE LEAD EXITS BODY.

5. Package and Ordering Information

Model	Order Number	Package	Package Option	Marking Information
COS2183	COS2183S	SOP-8	Tape and Reel, 4000	COS2183S
	COS2183D	DIP-8	Tube 50	COS2183
COS21834	COS21834S	SOP-14	Tape and Reel, 3000	COS21834S
	COS21834D	DIP-14	Tube 50	COS21834