LKS523

600V Half-Bridge Pre-Driver

Description

The LKS523 is a high voltage, high speed half-bridge pre-driver for power MOSFET and IGBT. It has inputs for both high side and low side, and two output channels with internal dead time to avoid cross-conduction.

The input logic level is compatible with 3.3V/5V/15V signal. The floating high side channel can drive a N-channel power MOSFET or IGBT up to 600V.

Features

- Floating channel operation up to 600V
- Robust at negative transient voltage
- Gate drive supply range from 10V to 20V
- 3.3V, 5V and 15V input logic compatible
- UVLO for both high side and low side
- Built-in 100ns dead time
- Available in SOP8 package

Applications

- H-bridge
- Inverters

Typical Application

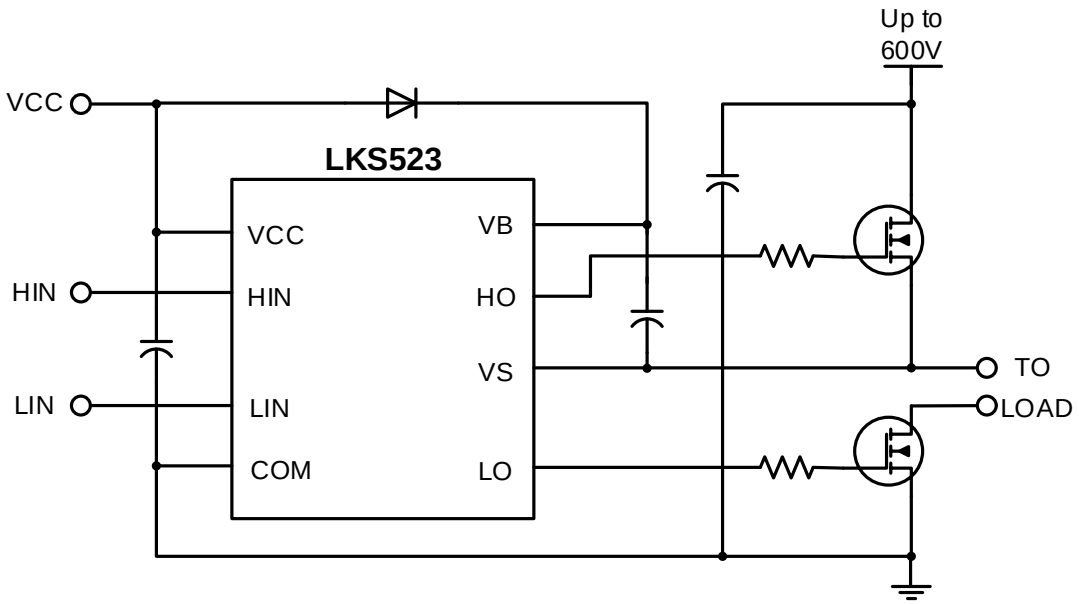
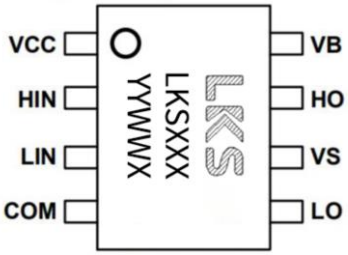


Figure 1. Schematic Diagram

Ordering Information

Part Number	Package	Package Method	Marking
LKS523	SOP8	Tape 4,000 pcs/Reel	LKS523 YYWWX

Pin Configuration and Marking Information



LKS: LOGO
LKSXXX: Device
YYWW: Year Week
X: Special code

Figure2 : Pin configuration

Pin Definition

Pin No.	Name	Description
1	VCC	Low side and logic supply voltage
2	HIN	Logic input for high side
3	LIN	Logic input for low side
4	COM	Logic ground and low side driver return
5	LO	Low side driver output
6	VS	High side driver return
7	HO	High side driver output
8	VB	High side floating supply

Absolute Maximum Ratings (Note 1)

Symbol	Parameters	Range	Units
V_B	High side floating supply voltage	-0.3 ~ 625	V
V_S	High side offset voltage	V_B – 25 ~ V_B + 0.3	V
V_{HO}	High side driver output voltage	V_S - 0.3 ~ V_B + 0.3	V
V_{CC}	Low side and logic supply voltage	-0.3 ~ 25	V
V_{LO}	Low side driver output voltage	-0.3 ~ V_{CC} + 0.3	V
V_{IN}	Logic input voltage (HIN/ LIN)	-0.3 ~ V_{CC} + 0.3	V
dV_s/dt	Allowable offset voltage slew rate	50	V/ns
P_{DMAX}	Package power dissipation (note 2)	0.625	W
θ_{JA}	Thermal resistance, junction to ambient	200	°C/W
T_J	Junction temperature	-40 ~ 150	°C
T_{STG}	Storage temperature	-55 ~ 150	°C

***Note 1**: Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. Under "recommended operating conditions" the device operation is assured, but some particular parameter may not be achieved. The electrical characteristics table defines the operation range of the device, the electrical characteristics is assured on DC and AC voltage by test program. For the parameters without minimum and maximum value in the EC table, the typical value defines the operation range, the accuracy is not guaranteed by spec.*

***Note 2**: The maximum power dissipation decreases if temperature rise, it is decided by TJMAX, θJA, and environment temperature (TA). The maximum power dissipation is the lower one between PDMAX = (TJMAX - TA) / θJA and the number listed in the maximum table.*

Recommended Operation Conditions

Symbol	Parameters	Range	Units
V_B	High side floating supply voltage	V_S + 10 ~ V_S + 20	V
V_S	High side offset voltage	–5 ~ 600	V
V_{HO}	High side driver output voltage	V_S ~ V_B	V
V_{CC}	Low side and logic supply voltage	10 ~ 20	V
V_{LO}	Low side driver output voltage	0 ~ V_{CC}	V
V_{IN}	Logic input voltage (HIN/LIN)	0 ~ V_{CC}	V

Electrical Characteristics (Note 3) (Unless otherwise specified, V_{CC}=V_{BS}=15V and T_A=25 °C)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics						
V_{CC_ON}	V_{CC} and V_{BS} under voltage rising threshold		8	8.5	9.8	V
V_{BS_ON}			-	8.7	10	V
V_{CC_UVLO}	V_{CC} and V_{BS} under voltage falling threshold		7.2	7.6	8.8	V
V_{BS_UVLO}			6.5	7.8	-	V
V_{CC_HYS}	V_{CC} and V_{BS} under voltage hysteresis voltage		0.6	0.9	1.2	V
V_{BS_HYS}			-	0.9	-	V
I_{QCC}	Quiescent V_{CC} supply current	HIN=LIN=0V	-	50	150	uA
I_{QBS}	Quiescent V_{BS} supply current	HIN=LIN=0V	-	35	80	uA
I_{LK}	Offset supply leakage current	V_{HO}=V_B=V_S=620V	-	-	10	uA
V_{IH}	Logic “1” input trigger voltage		2.4	-	-	V
V_{IL}	Logic “0” input trigger voltage		-	-	0.6	V
$I_{ISOURCE}$	Logic “1” input bias current	HIN, LIN=5V	-	32	100	uA
I_{ISINK}	Logic “0” input bias current	HIN, LIN=0V	-	-	1.0	uA
V_{OH}	High level output voltage	I_O=20mA	-	-	1.0	V
V_{OL}	Low level output voltage	I_O=20mA	-	-	1.0	V
I_{O+}	Output high short circuit pulse current	V_O=0V, V_{IN}=5V, Pulse Width < 10uS	600	800	-	mA
I_{O-}	Output low short circuit pulse current	V_O=15V, V_{IN}=0V, Pulse Width < 10uS	800	1200	-	mA
Dynamic Characteristics (C_L=1nF)						
t_{on}	Turn-on propagation delay	V_S=0V	100	250	450	ns
t_{off}	Turn-off propagation delay	V_S=0V or 600V	80	160	300	ns
t_r	Turn-on rise time		-	40	100	ns
t_f	Turn-off fall time		-	12	50	ns
DT	Dead time		40	100	250	ns
MT	Delay match	t_{on} & t_{off} for (HS-LS)	-	-	80	ns

***Note 3**: The maximum and minimum parameters specified are guaranteed by test, the typical value is guaranteed by design, characterization and statistical analysis.*

Internal Block Diagram

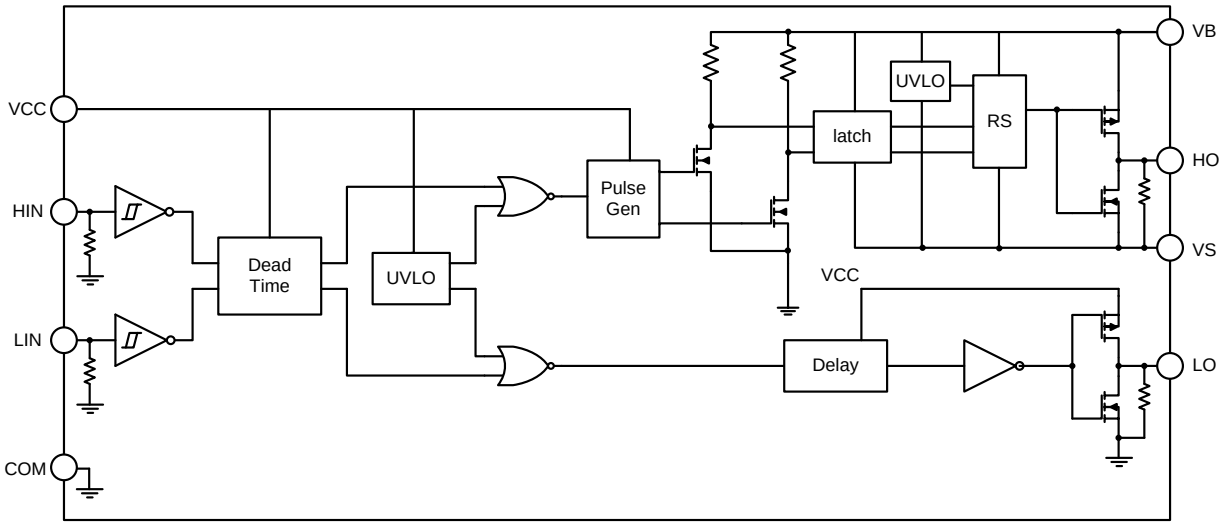


Figure3 : Internal block diagram

Waveforms

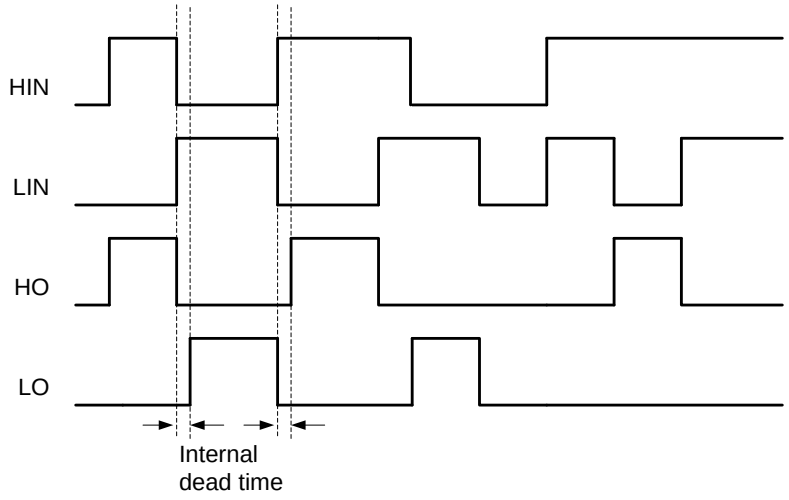


Figure 4. Input/ Output Timing Diagram

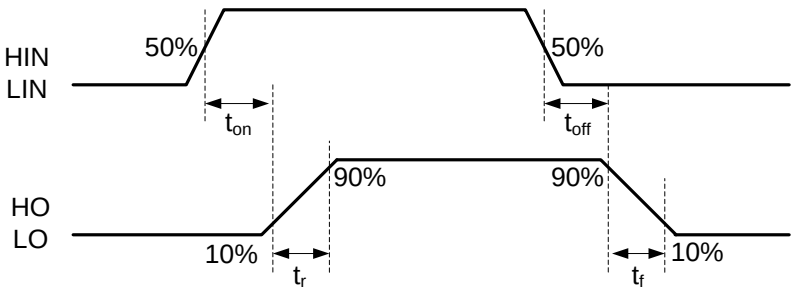


Figure 5. Switching Timing Waveforms

Typical Performance Characteristics

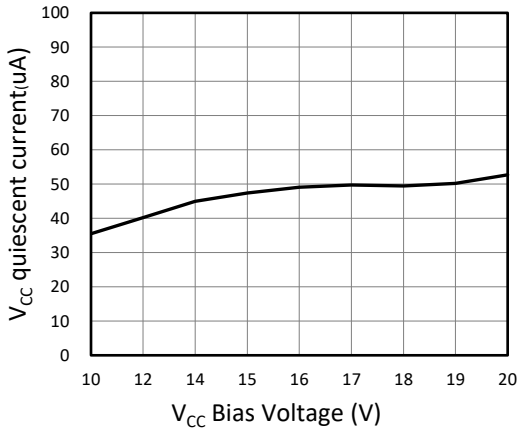


Figure 6 I_{QCC} vs. V_{CC}

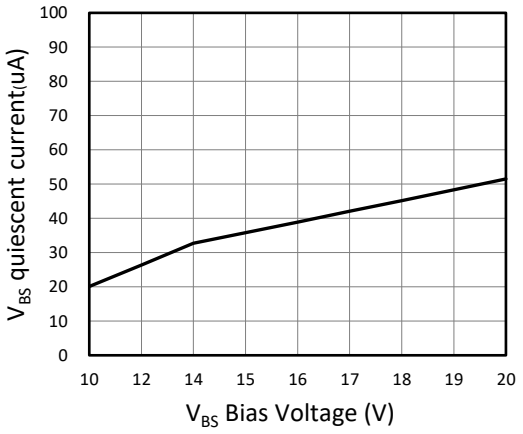


Figure 7 I_{QBS} vs. V_{BS}

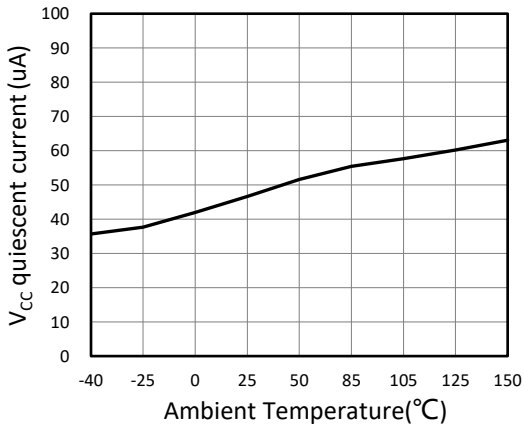


Figure 8 I_{QCC} vs. Ta

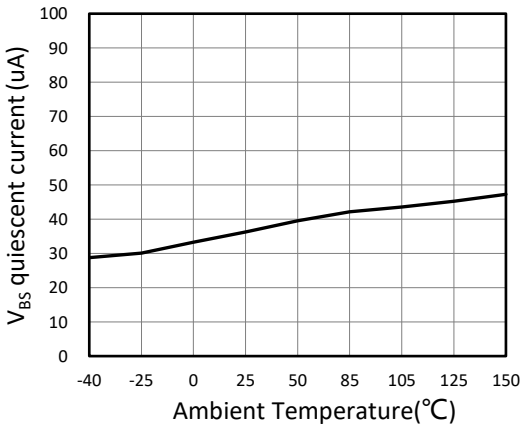


Figure 9 I_{QBS} vs. Ta

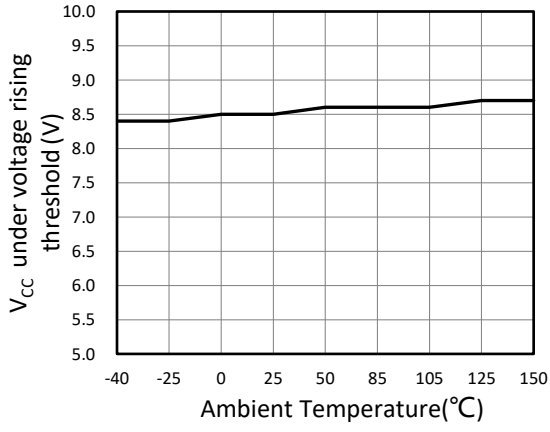


Figure 10 V_{CC_ON} vs. Ta

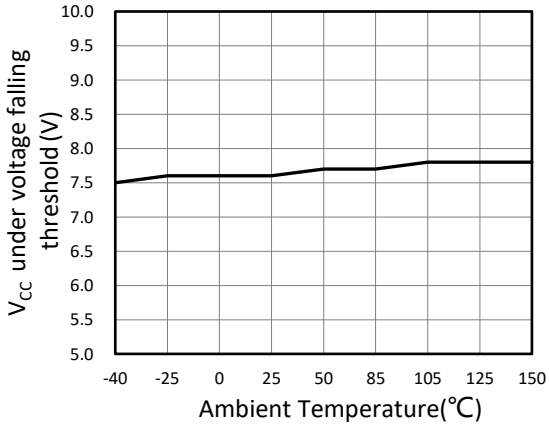


Figure 11 V_{CC_OFF} vs. Ta

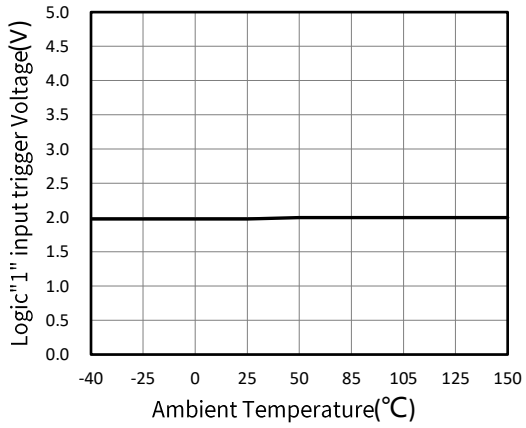


Figure 12 $IN_{\_ON}$ vs. Ta

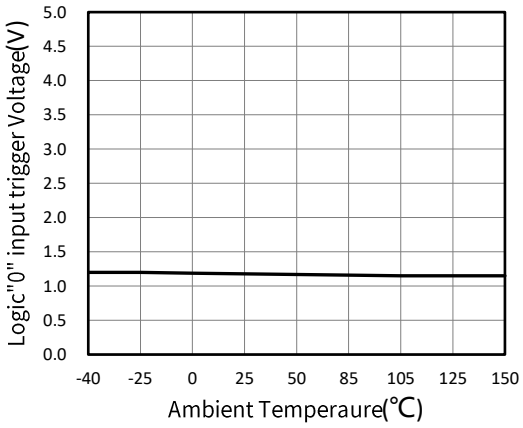


Figure 13 $IN_{\_OFF}$ vs. Ta

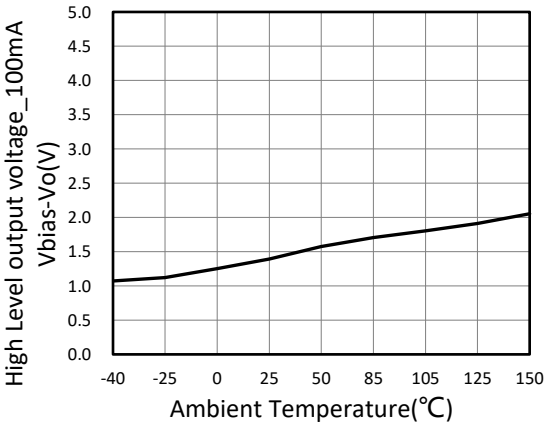


Figure 14 Vo_H vs. Ta

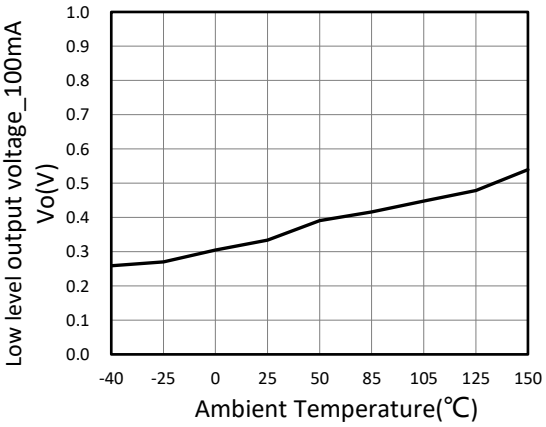


Figure 15 Vo_L vs. Ta

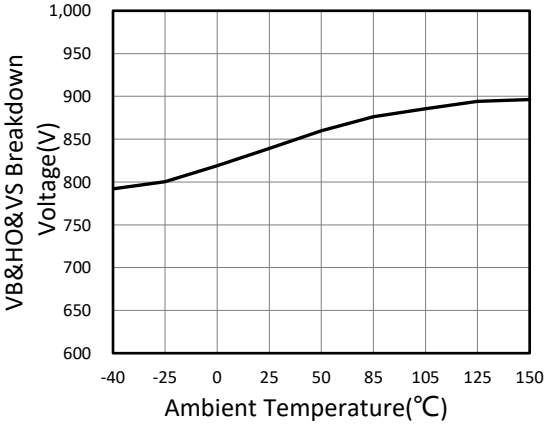
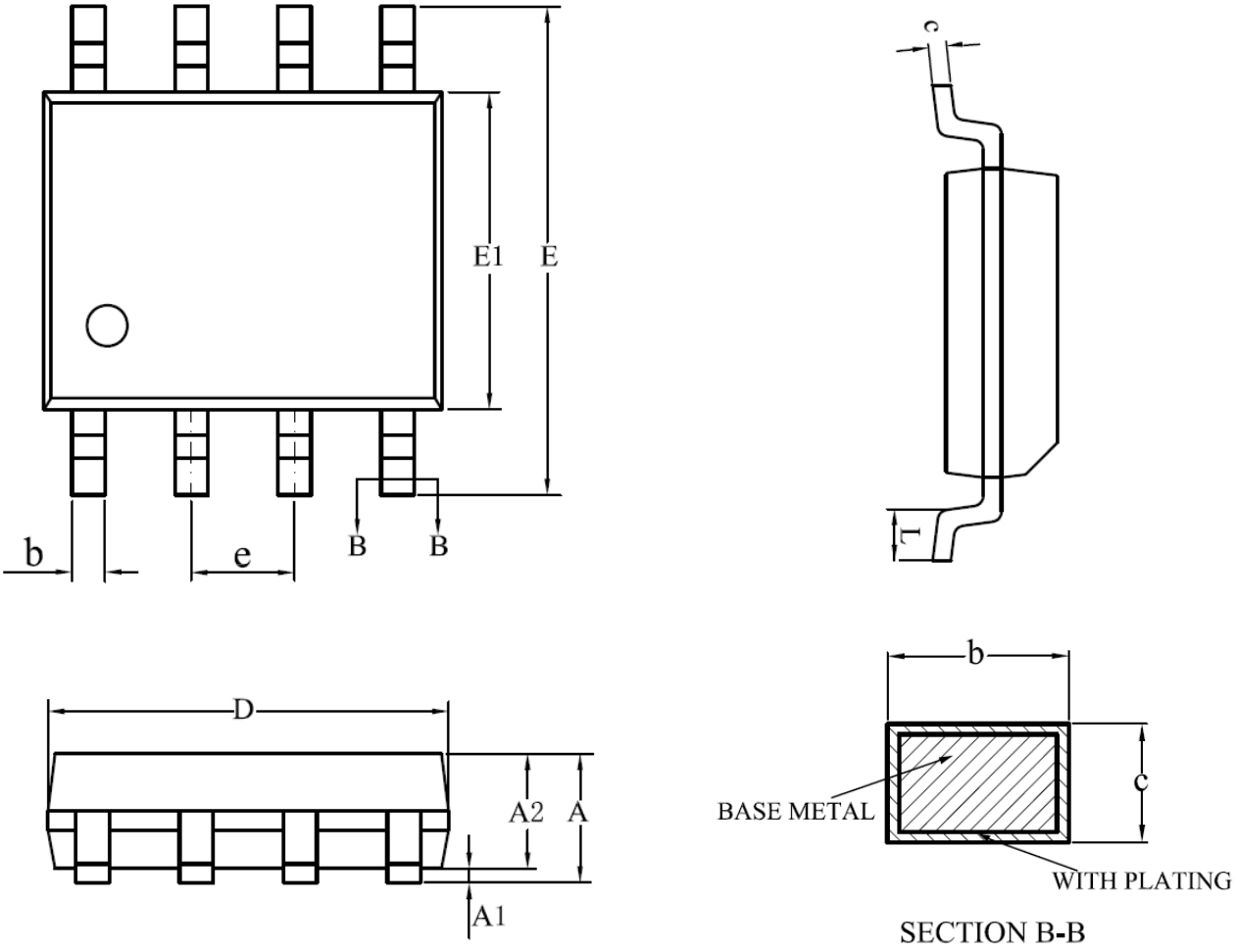


Figure 16 $BV_{\_VB\&HO\&VS}$ vs. Ta

Physical Dimensions



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.30	-	1.80
A1	0.05	-	0.25
A2	1.25	1.40	1.65
b	0.33	-	0.51
c	0.17	-	0.25

D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
L	0.40	-	1.00

Revision Information

Revision	Date	Notes
Rev. 1.1	2021/01	Modify function description
Rev. 1.0	2020/12	Initial Revision

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