■ Description

The WD2003 are high-voltage, high-current Darlington drivers comprised of seven NPN Darlington pairs.
All units feature integral clamp diodes for switching inductive loads.
Applications include relay, hammer, lamp and display (LED) drivers.

■ Features and Benefits

- Output Current (Single Output): 500mA (MAX.)
- High Sustaining Voltage Output: 50V (MIN.)
- Output Clamp Diodes
- Inputs Compatible With Various Types Of Logic

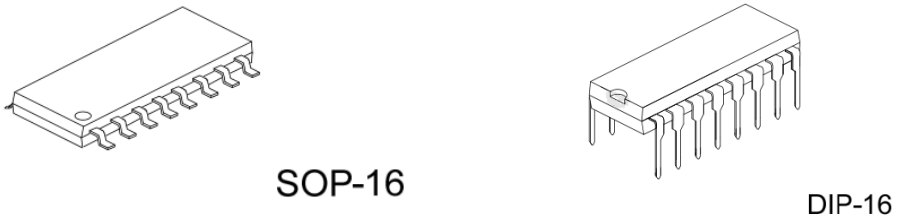


Figure 1. Package Type of WD2003

■ Pin Configuration

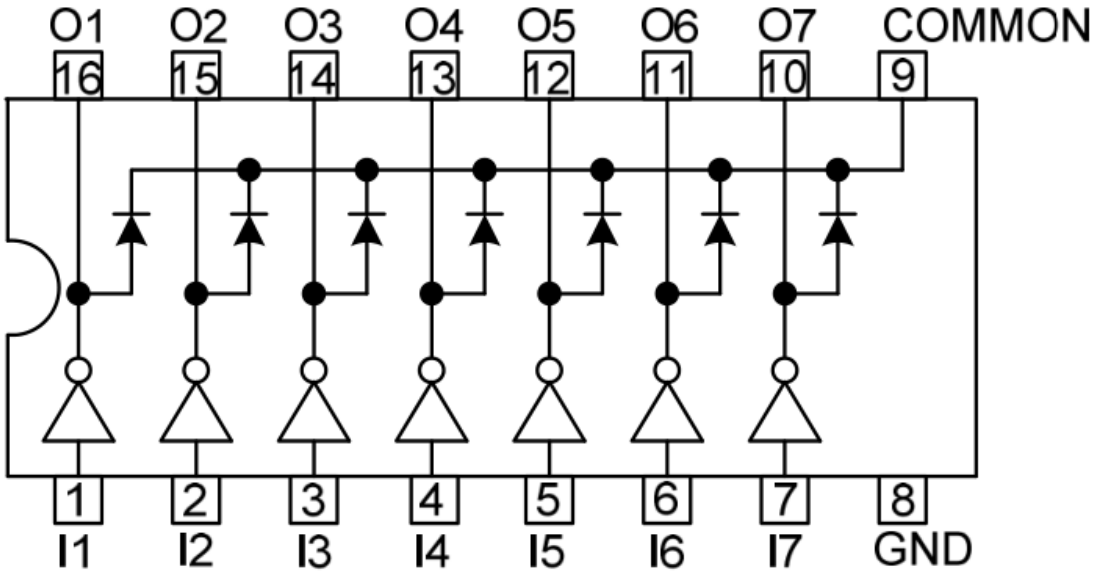


Figure 2. Pin Configuration of WD2003

■ Functional Block Diagram

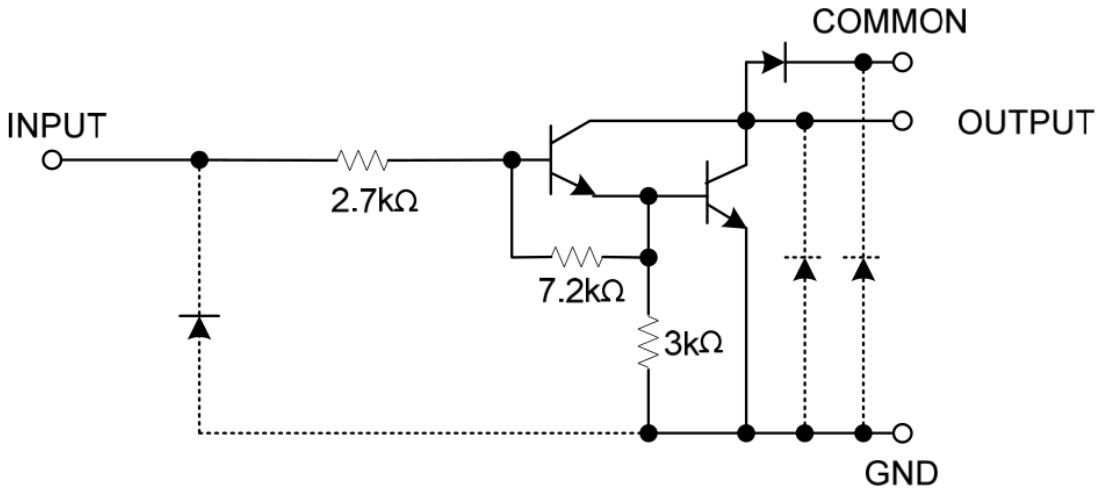


Figure 3. Functional Block Diagram of WD2003

■ Ordering Information

WD2003 □ □—□

Circuit Type

Package

S：SOP16

D：DIP16

G: Green

Packing

Blank : Tube

TR : Tape and Reel

Package	Part Number Green	Marking ID Green	Packing Type
SOP16	WD2003STR-G	WD2003	Tape and Reel
	WD2003S-G	WD2003	Tube
DIP16	WD2003D-G	WD2003	Tube

WADE's Products with"G" suffix are available in green package. are RoHS compliant.

■ Absolute Maximum Ratings (Ta= 25˚C)

Parameter		Symbol	Value	Unit
Output Sustaining Voltage		V_{OUT}	-0.5~50	V
Input Voltage		V_{IN}	-0.5~30	V
Clamp Diode Reverse Voltage		V_R	50	V
Output Current		I_{OUT}	500	mA / ch
Clamp Diode Forward Current		I_F	500	mA
Power Dissipation	DIP-16	P_D	1.47	W
	SOP-16		1.25 (Note2)	W
Junction Temperature		T_J	+125	°C
Operating Temperature		T_{OPR}	-40~+85	°C
Storage Temperature		T_{STG}	-55~+150	°C

Note 1: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

Note 2: On PCB

■ Recommended Operating Conditions (T_A=-40～+85˚C)

Parameter		Symbol	Conditions		Min	Max	Unit
Output Sustaining Voltage		V_{OUT}			0	50	V
Output Current	DIP-16	I_{OUT}	T_{PW} = 25ms T_A = 85°C T_J = 120°C	Duty = 10%	0	350	mA/ch
				Duty = 50%	0	100	
	SOP-16			Duty = 10%	0	300	
				Duty = 50%	0	90	
Input Voltage		V_{IN}			0	24	V
Input Voltage (Output On)		$V_{IN\ (ON)}$	I_{OUT} = 400mA		2.8	24	V
Input Voltage (Output Off)		$V_{IN\ (OFF)}$			0	0.7	V
Clamp Diode Reverse Voltage		V_R				50	V
Clamp Diode Forward Current		I_F				350	mA
Power Dissipation	DIP-16	P_D	T_A = 85°C			0.76	W
	SOP-16		T_A = 85°C (Note)			0.65	

Note: On PCB

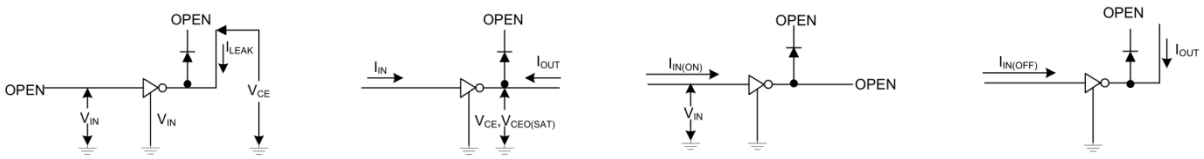
■ Electrical Characteristics

T_A =25 ℃, unless otherwise specified.

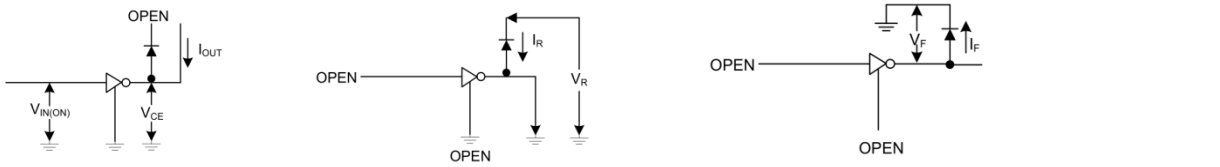
Parameter	Symbol	Circuit	Conditions	Min	Typ	Max	Unit
Output Leakage Current	I_{LEAK}	1	V_{CE} = 50 V, T_A = 25°C			50	μA
			V_{CE} = 50 V, T_A = 85°C			100	
Collector-Emitter Saturation Voltage	$V_{CEO(SAT)}$	2	I_{OUT} = 350 mA, I_{IN} = 500 μA		1.3	1.6	V
			I_{OUT} = 200 mA, I_{IN} = 350 μA		1.1	1.3	
			I_{OUT} = 100 mA, I_{IN} = 250 μA		0.9	1.1	
DC Current Transfer Ratio	h_{FE}	2	V_{CE} = 2 V, I_{OUT} = 350 mA	1000			
Input Current (Output On)	$I_{IN\ (ON)}$	3	V_{IN} = 2.4 V, I_{OUT} = 350 mA		0.4	0.7	mA
Input Current (Output Off)	$I_{IN\ (OFF)}$	4	I_{OUT} = 500 μA, T_A = 85°C	50	65		μA
Input Voltage (Output On)	$V_{IN(ON)}$	5	V_{CE} = 2 V, I_{OUT} = 350 mA			2.6	V
			V_{CE} = 2 V, I_{OUT} = 200 mA			2.0	
Clamp Diode Reverse Current	I_R	6	V_R = 50 V, T_A = 25°C			50	μA
			V_R = 50 V, T_A = 85°C			100	
Clamp Diode Forward Voltage	V_F	7	I_F = 350 mA			2.0	V
Input Capacitance	C_{IN}				15		pF
Turn-On Delay	t_{ON}	8	V_{OUT} = 50 V, R_L = 125 Ω, C_L = 15 pF		0.1		μs
Turn-Off Delay	t_{OFF}	8	V_{OUT} = 50 V, R_L = 125 Ω, C_L = 15 pF		0.2		

■ Test Circuit

1. I_{LEAK} 2. $V_{CEO(SAT)}$,h_{FE} 3. $I_{IN(ON)}$ 4. $I_{IN(OFF)}$



5. $V_{IN(ON)}$ 6. I_R 7. $V_{F8.}$



8. t_{ON} , t_{OFF}

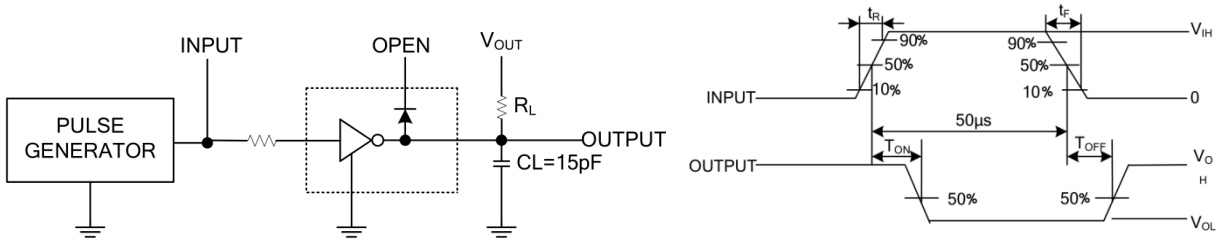


Figure 4. Test circuit of WD2003

■ Typical Performance Characteristics

T_A = 25 ℃, unless otherwise specified.

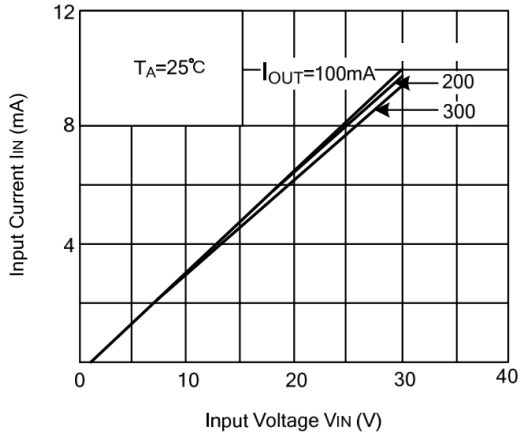


Figure 5. Iin vs. Vin(with Iout)

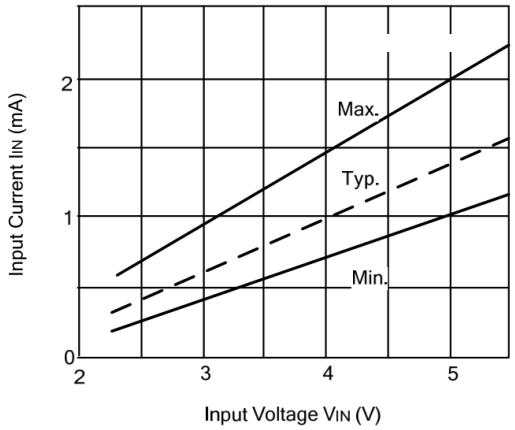


Figure 6. Iin vs. Vin(out open)

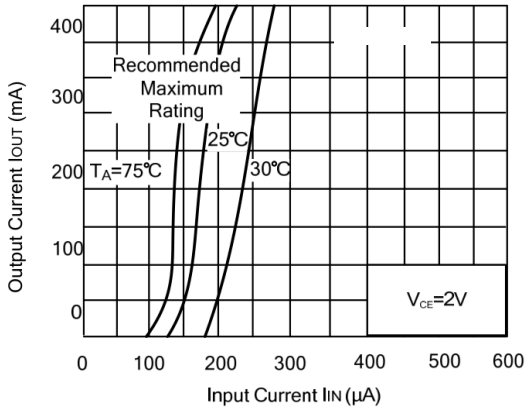


Figure 7. Iout vs. Iin

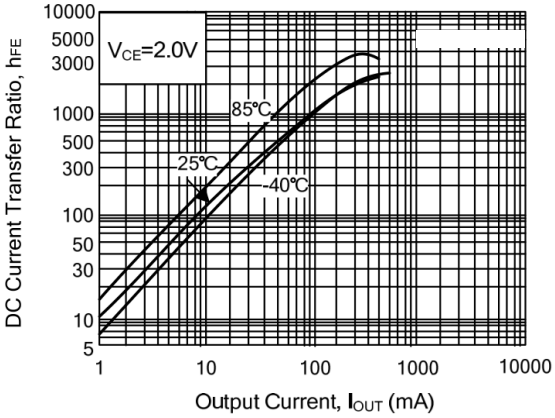


Figure 8. h_{FE} vs. Iout

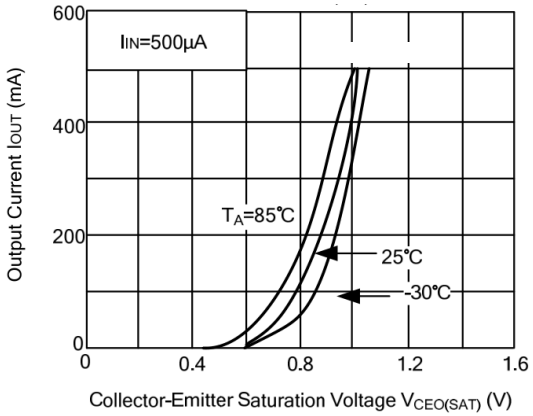


Figure 9. Iout vs. $V_{CEO(SAT)}$

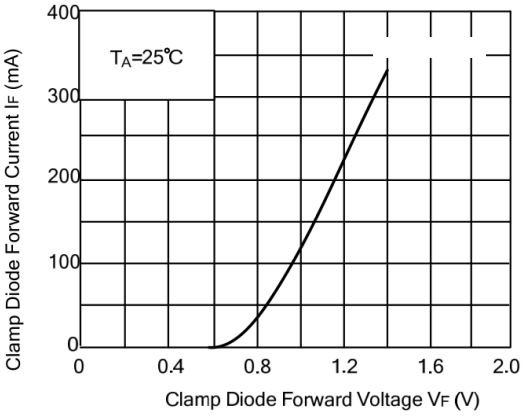


Figure 10. I_F vs. V_F

■ Typical Performance Characteristics (Continued)

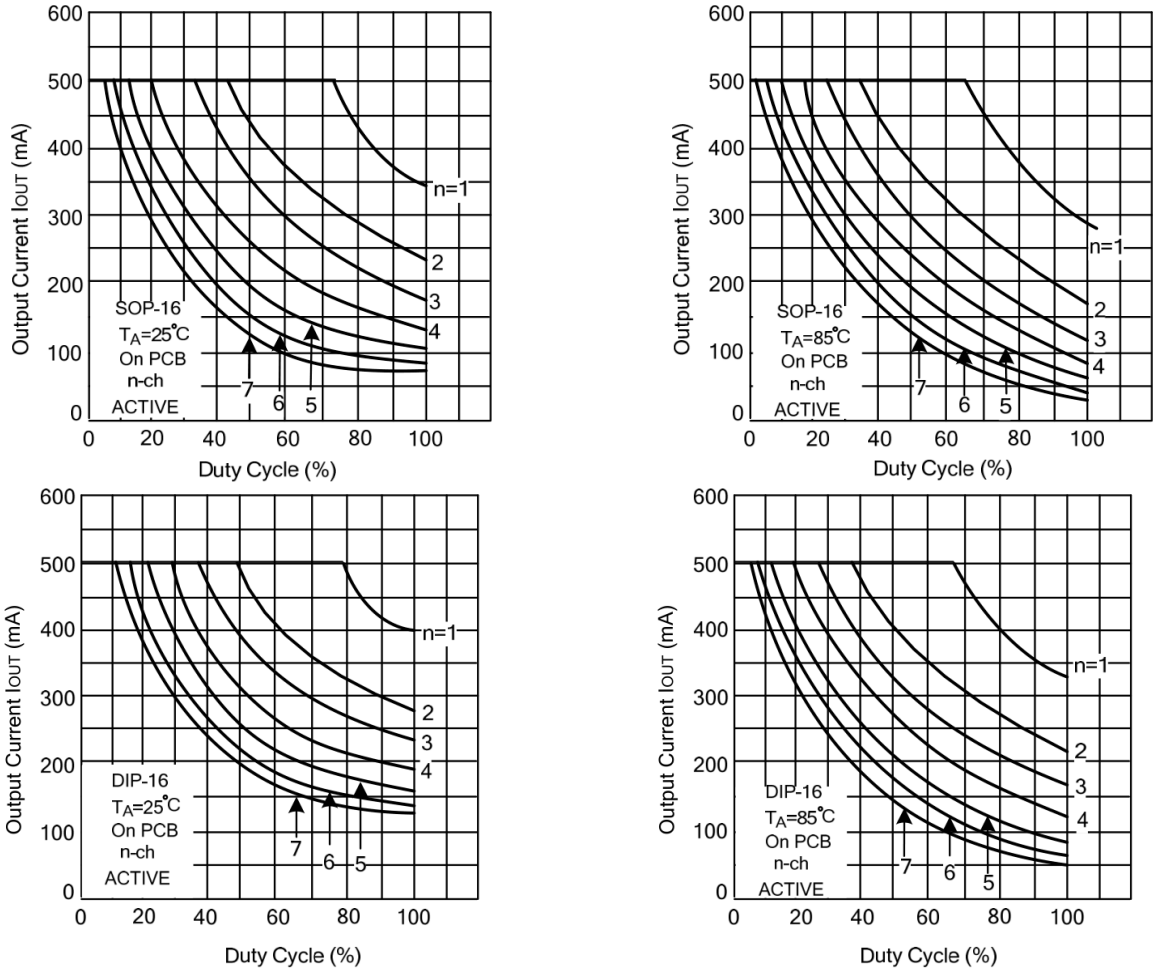


Figure 11.Iout vs. Duty Cycle

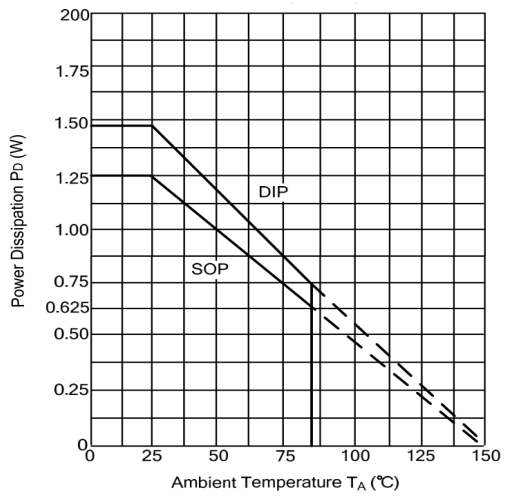
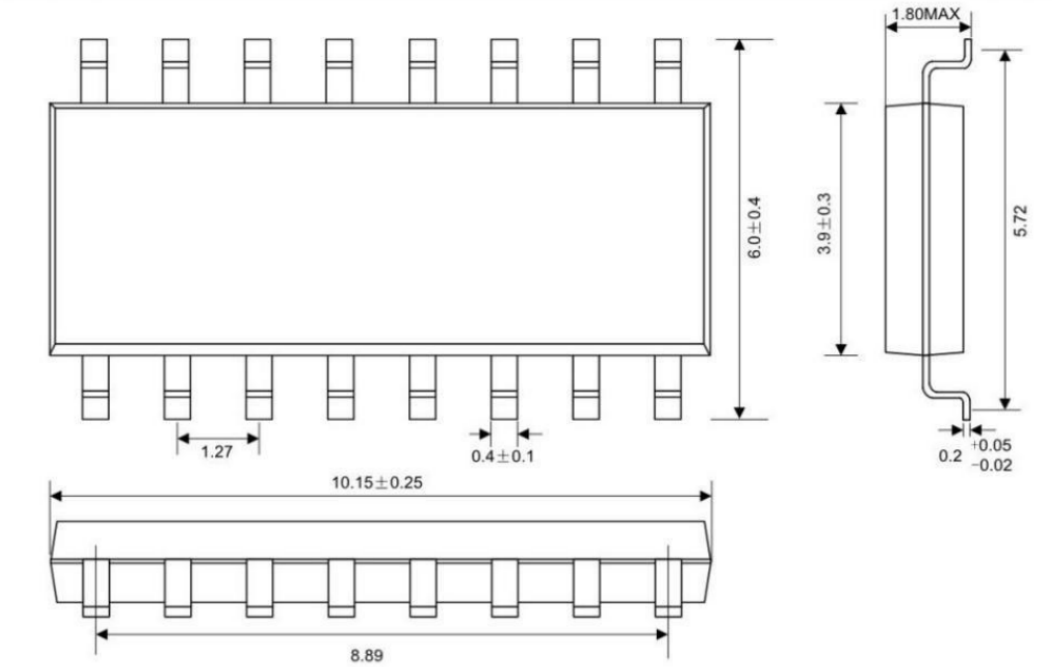


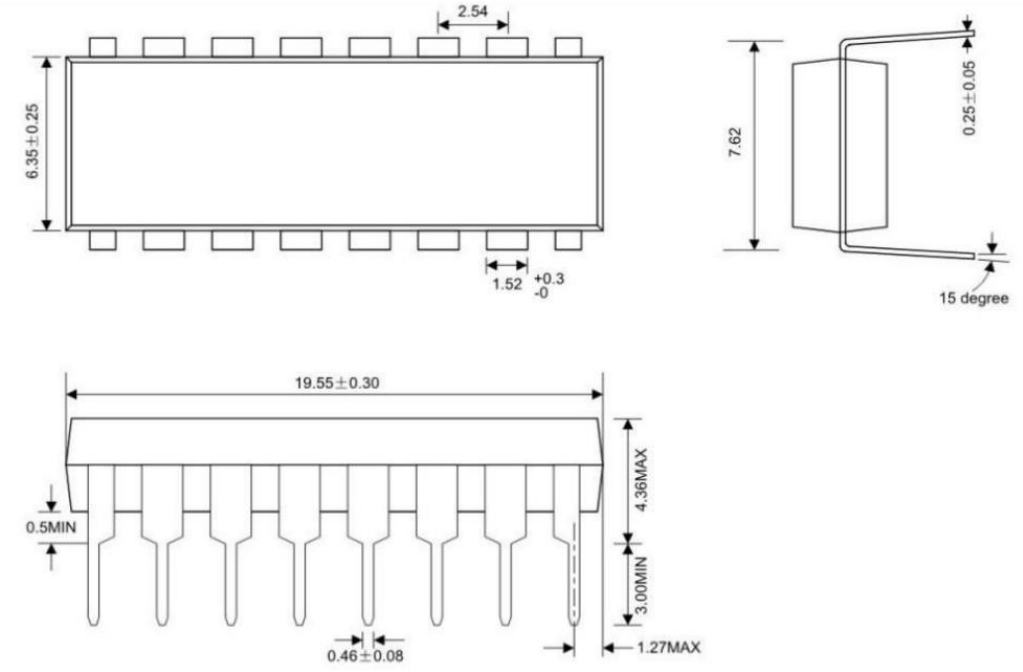
Figure 12. P_D vs. Temperature

■ Package Outline Dimensions

SOP16 **Unit: mm**



DIP16 **Unit: mm**



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