

■ Description

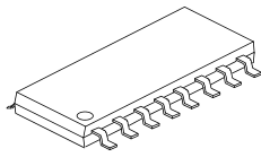
The WD2003 are high-voltage, high-current Darlington drivers comprised of seven NPN Darlington pairs.

All units feature integral clamp diodes for switching inductive loads.

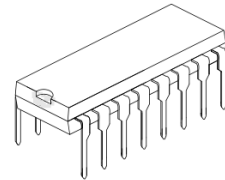
Applications include relay, hammer, lamp and display (LED) drivers.

■ 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



SOP-16



DIP-16

Figure 1. Package Type of WD2003

■ Pin Configuration

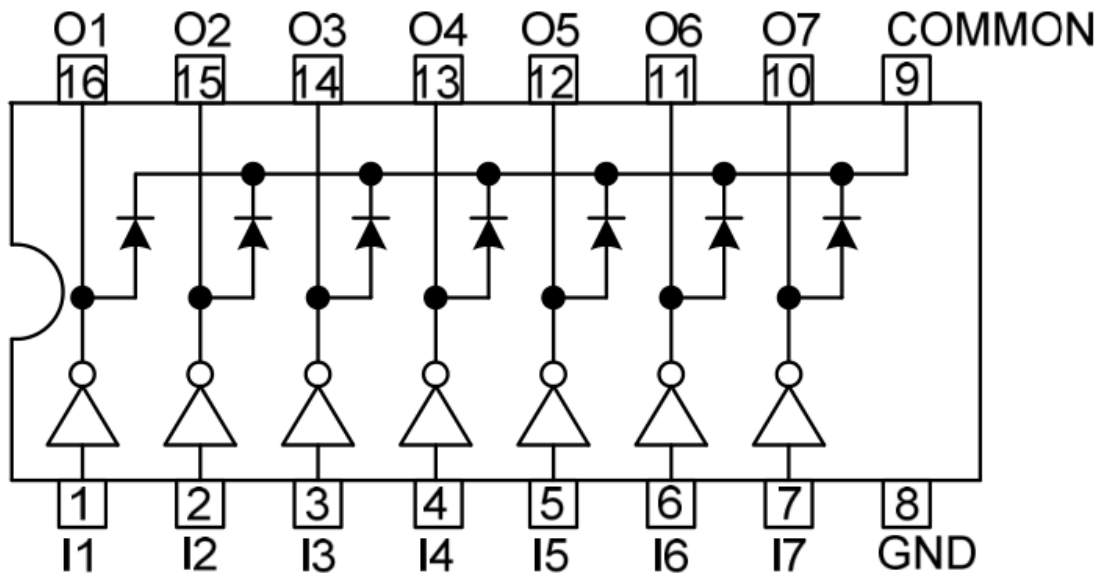


Figure 2. Pin Configuration of WD2003

Functional Block Diagram

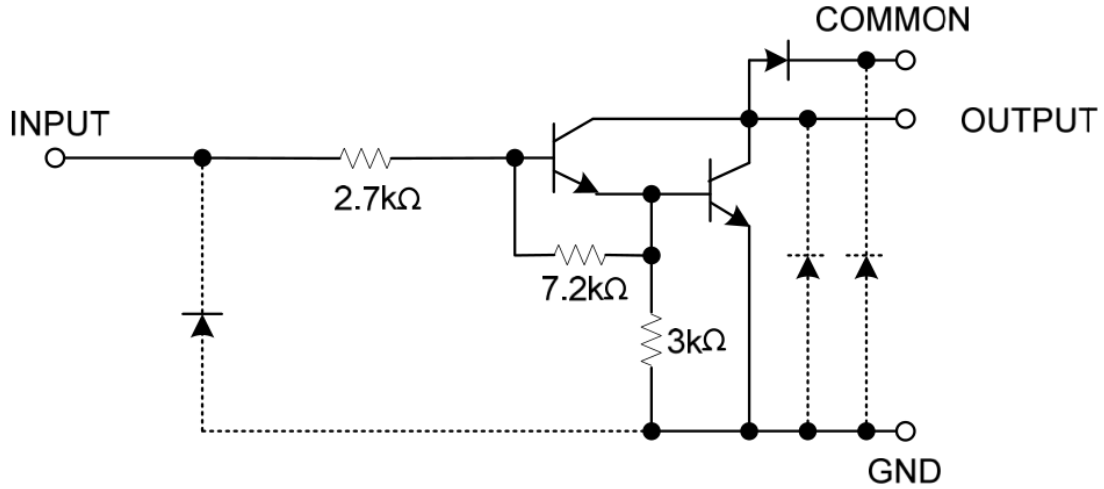
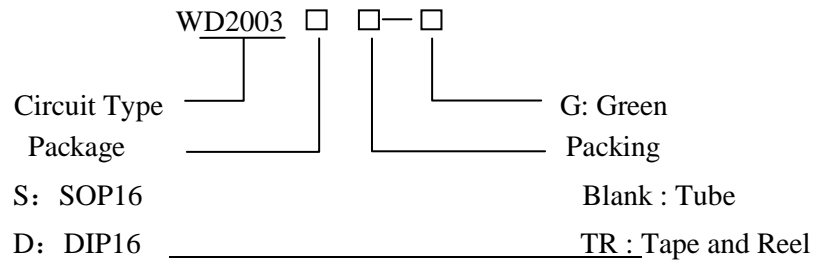


Figure 3. Functional Block Diagram of WD2003

Ordering Information



Package	Part Number	Marking ID	Packing Type
	Green	Green	
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	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 (TA=-40~+85°C)

Parameter	Symbol	Conditions	Min	Max	Unit	
Output Sustaining Voltage	V_{OUT}		0	50	V	
Output Current	DIP-16	$T_{PW} = 25ms$ $T_A = 85°C$ $T_J = 120°C$	Duty = 10%	0	350	mA/ch
			Duty = 50%	0	100	
			Duty = 10%	0	300	
			Duty = 50%	0	90	
	SOP-16					
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	$T_A = 85°C$		0.76	W	
	SOP-16	$T_A = 85°C$ (Note)		0.65		

Note: On PCB

■ Electrical Characteristics

$T_A = 25^\circ\text{C}$, unless otherwise specified.

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

■ Test Circuit

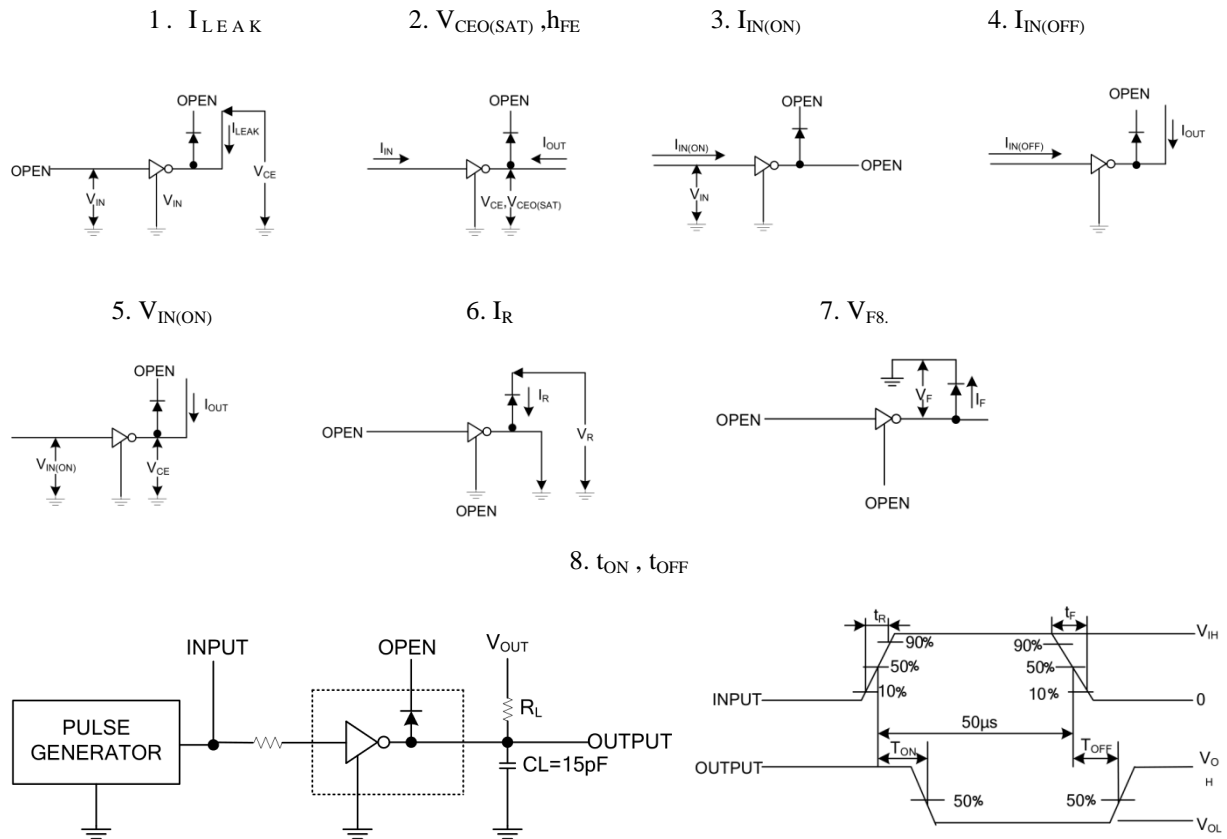


Figure 4. Test circuit of WD2003

■ Typical Performance Characteristics

$T_A = 25^\circ\text{C}$, unless otherwise specified.

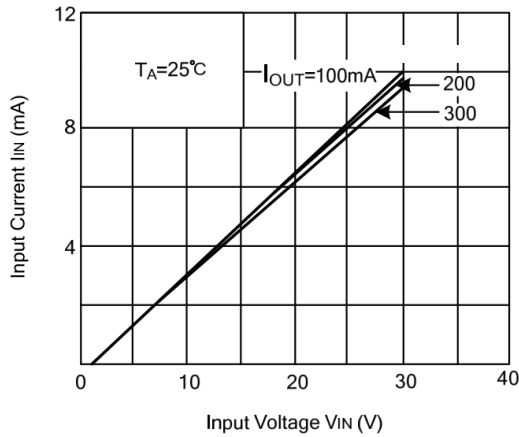


Figure 5. I_{IN} vs. V_{IN} (with I_{OUT})

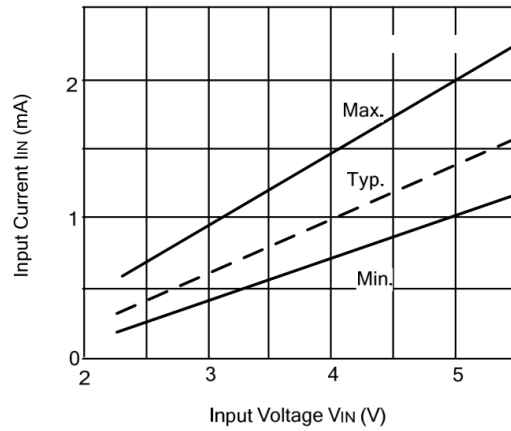


Figure 6. I_{IN} vs. V_{IN} (out open)

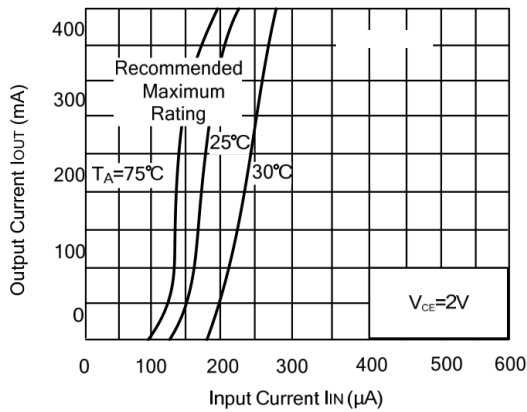


Figure 7. I_{OUT} vs. I_{IN}

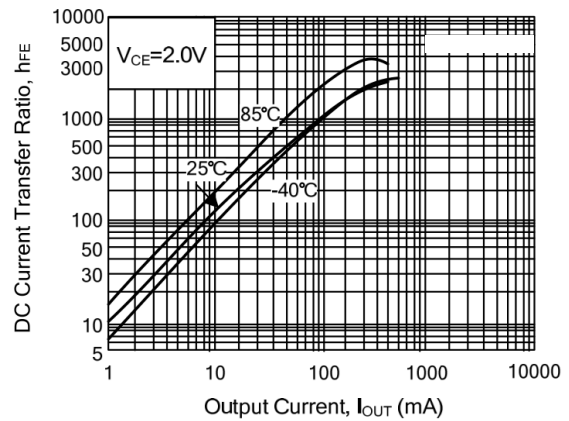


Figure 8. h_{FE} vs. I_{OUT}

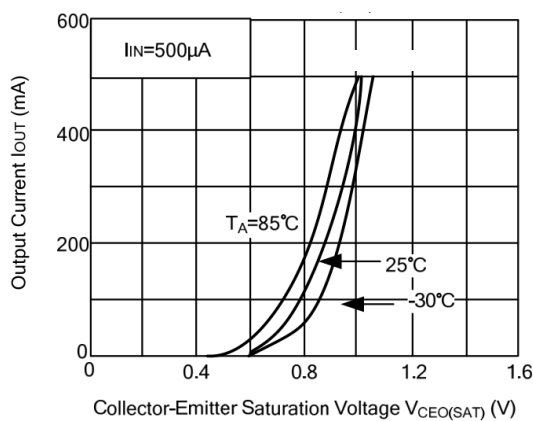


Figure 9. I_{OUT} vs. $V_{CE0(SAT)}$

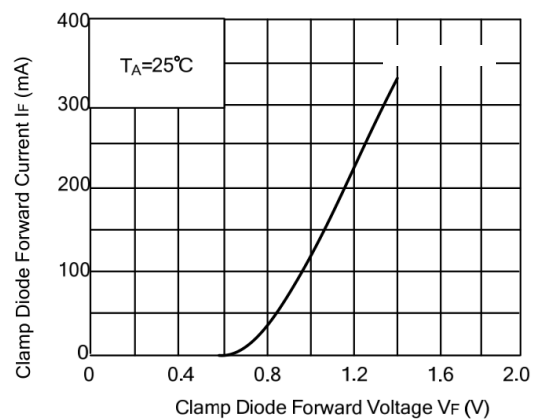


Figure 10. I_F vs. V_F

Typical Performance Characteristics (Continued)

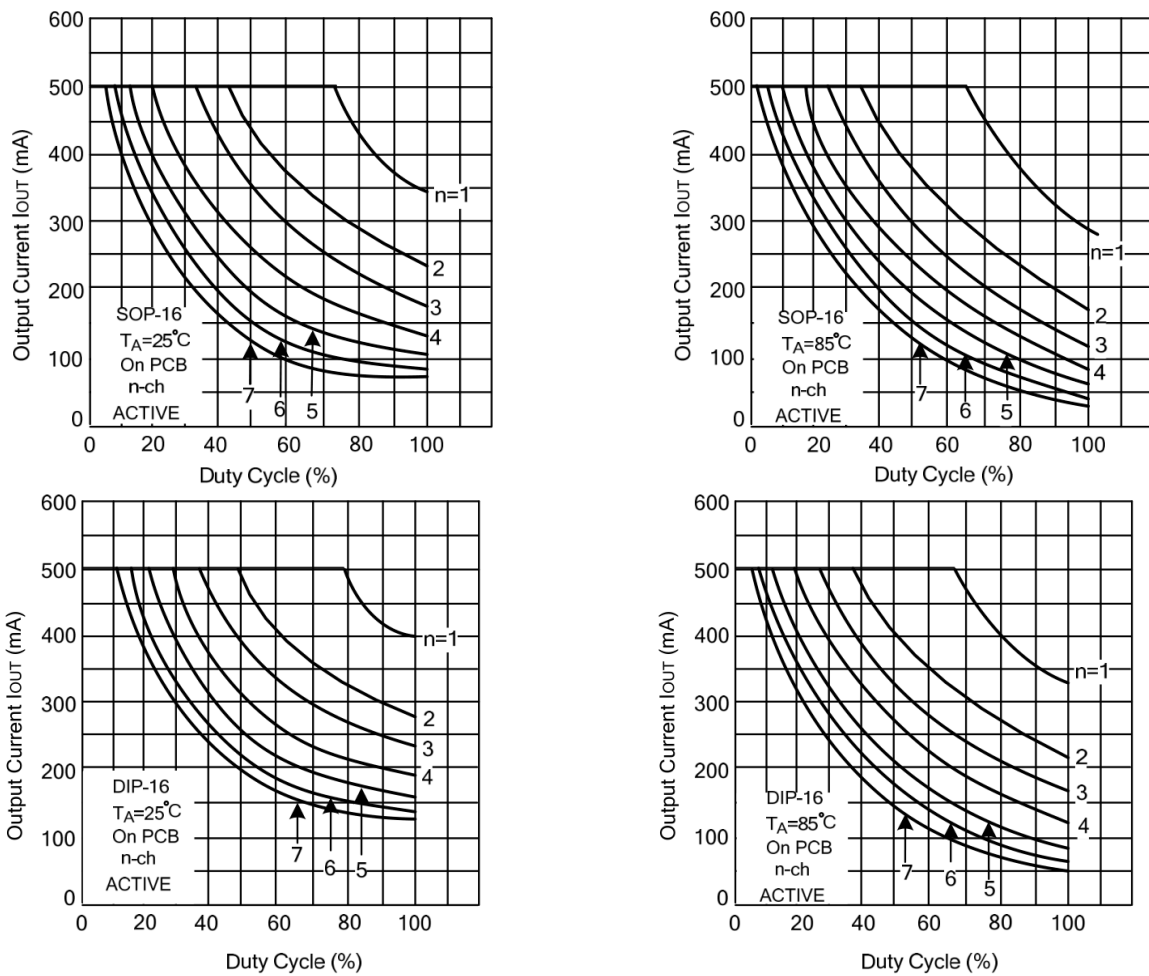


Figure 11. I_{out} vs. Duty Cycle

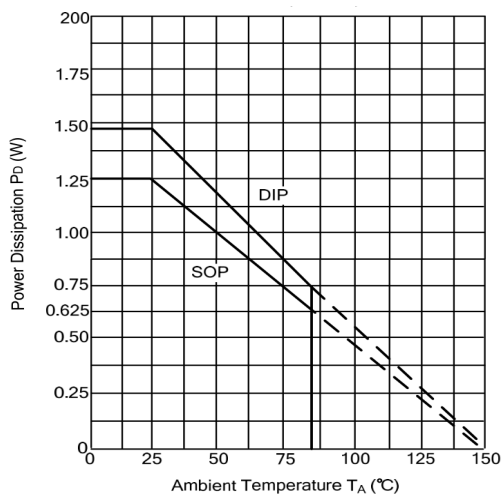
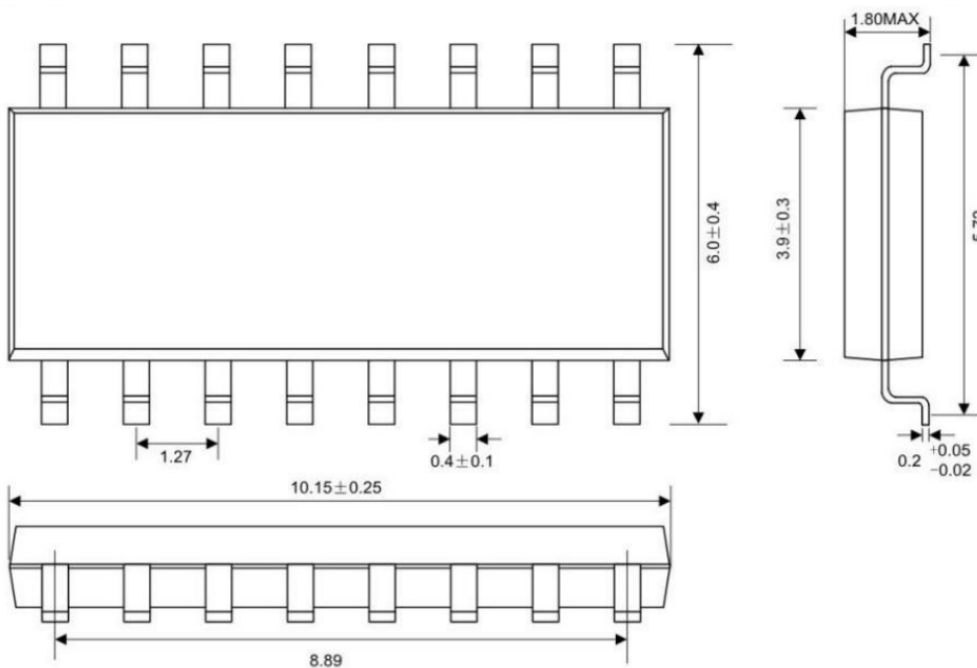


Figure 12. P_D vs. Temperature

■ Package Outline Dimensions

SOP16

Unit: mm



DIP16

Unit: mm

