

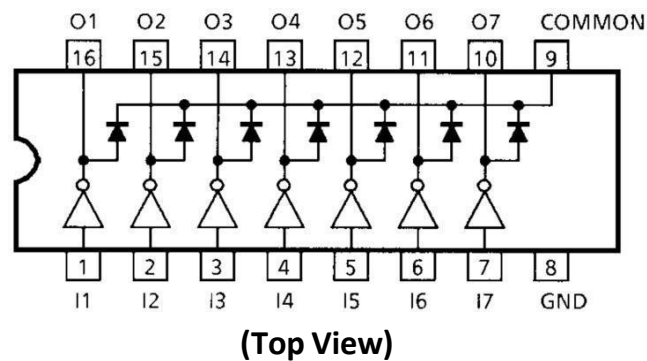
1. DESCRIPTION

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

2. FEATURES

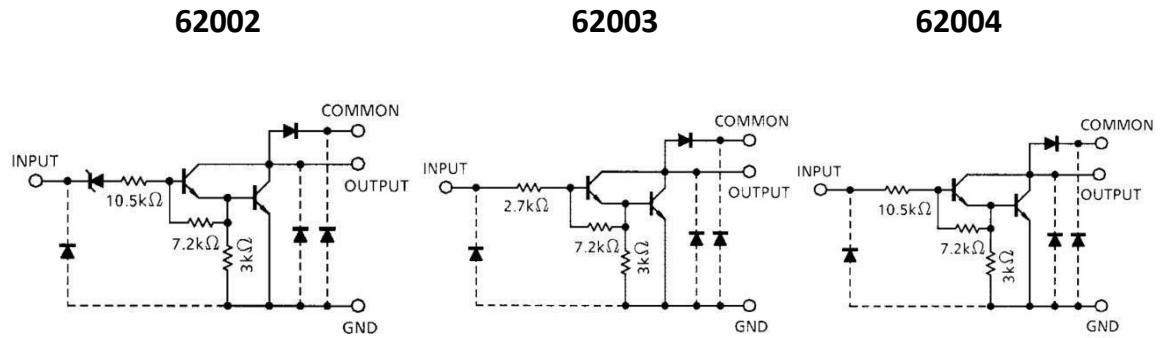
- Output current (single output): 500 mA (max)
- High sustaining voltage output: 50 V (min)
- Output clamp diodes
- Inputs compatible with various types of logic

3. PIN CONNECTION



Type	Input base resistor	Designation
XD62002	10.5-k Ω + 7-V Zener diode	14-V to 25-V PMOS
XL/XD62003	2.7 k Ω	TTL, 5-V CMOS
XD/XL62004	10.5 k Ω	6-V to 15-V PMOS, CMOS

4. SCHEMATICS(each driver)



Note: The input and output parasitic diodes cannot be used as clamp diodes.

5. MAXIMUM RATINGS($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Output sustaining voltage	$V_{CE(SUS)}$	-0.5 to 50	V
Output current	I_{OUT}	500	mA/ch
Input voltage	V_{IN} (Note 1)	-0.5 to 30	V
Input current	I_{IN} (Note 2)	25	mA
Clamp diode reverse voltage	V_R	50	V
Clamp diode forward current	I_F	500	mA
Power dissipation	P_D	1.47	W
		0.625 (Note 3)	
Operating temperature	T_{opr}	-40 to 85	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to 150	$^\circ\text{C}$

6. RECOMMENDED OPERATING CONDITIONS(Ta = -40°C to 85°C)

Characteristics		Symbol	Condition		Min	Typ.	Max	Unit
Output sustaining voltage		V _{CE (SUS)}			0	—	50	V
Output current		I _{OUT}	T _{pw} = 25 ms 7 circuits T _a = 85°C T _j = 120°C	Duty = 10%	0	—	370	mA/ch
				Duty = 50%	0	—	130	
				Duty = 10%	0	—	233	
				Duty = 50%	0	—	70	
Input voltage		V _{IN}			0	—	24	V
Input voltage (output on)	XD62002	V _{IN (ON)}	I _{OUT} = 400 mA h _{FE} = 800		14.5	—	24	V
	XD62003				2.8	—	24	
	XD/XL62004				6.2	—	24	
Input voltage (output off)	XD62002	V _{IN (OFF)}			0	—	7.4	V
	XD/XL62003				0	—	0.7	
	XD/XL62004				0	—	1.0	
Clamp diode reverse voltage		V _R			—	—	50	V
Clamp diode forward current		I _F			—	—	350	mA
Power dissipation		P _D	T _a = 85°C		—	—	0.76	W
			T _a = 85°C(Note)		—	—	0.325	

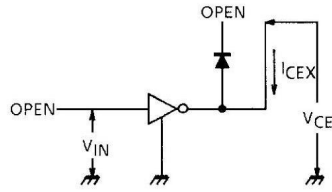
Note: When mounted on a glass-epoxy PCB (30 mm × 30 mm × 1.6 mm, Cu area: 50%)

7. ELECTRICAL CHARACTERISTICS(Ta = 25°C unless otherwise noted)

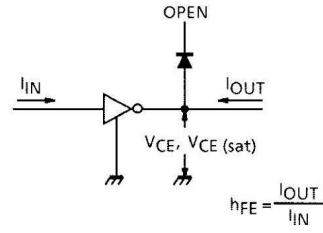
Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
Ooutput leakage current		I _{CEX}	1	V _{CE} = 50 V, T _a = 25°C	—	—	50	μA	
				V _{CE} = 50 V, T _a = 85°C	—	—	100		
Collector–emitter saturation voltage		V _{CE (sat)}	2	I _{OUT} = 350 mA, I _{IN} = 500 μA	—	1.3	1.6	V	
				I _{OUT} = 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)	XD62002	I _{IN (ON)}	3	V _{IN} = 20 V, I _{OUT} = 350 mA	—	1.1	1.7	mA	
	XD/XL62003			V _{IN} = 2.4 V, I _{OUT} = 350 mA	—	0.4	0.7		
	XD/XL62004			V _{IN} = 9.5 V, I _{OUT} = 350 mA	—	0.8	1.2		
Input current (output off)		I _{IN (OFF)}	4	I _{OUT} = 500 μA, T _a = 85°C	50	65	—	μA	
Input voltage (output on)	XD62002	V _{IN (ON)}	5	V _{CE} = 2 V h _{FE} = 800	I _{OUT} = 350 mA	—	—	13.7	V
					I _{OUT} = 200 mA	—	—	11.4	
	XD/XL62003				I _{OUT} = 350 mA	—	—	2.6	
					I _{OUT} = 200 mA	—	—	2.0	
	XD/XL62004				I _{OUT} = 350 mA	—	—	4.7	
					I _{OUT} = 200 mA	—	—	4.4	
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		
Clampdiode 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	—		

8. TEST CIRCUIT

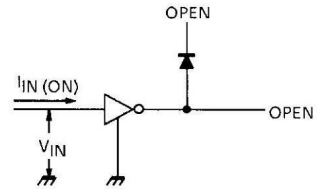
1. I_{CEX}



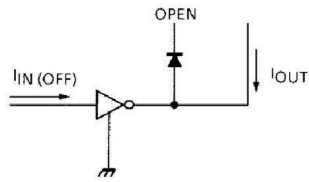
2. $V_{CE} (sat)$, h_{FE}



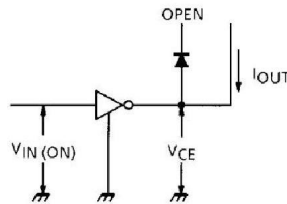
3. $I_{IN} (ON)$



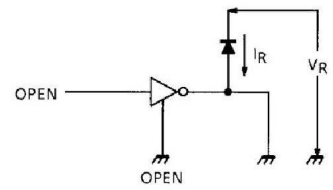
4. $I_{IN} (OFF)$



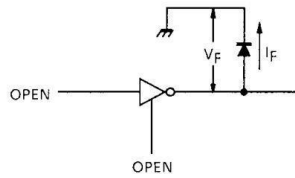
5. $V_{IN} (ON)$



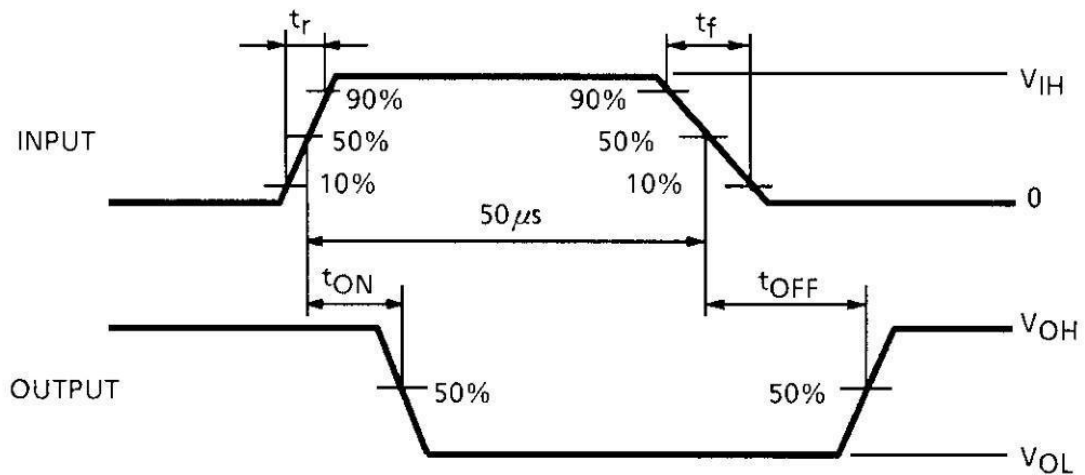
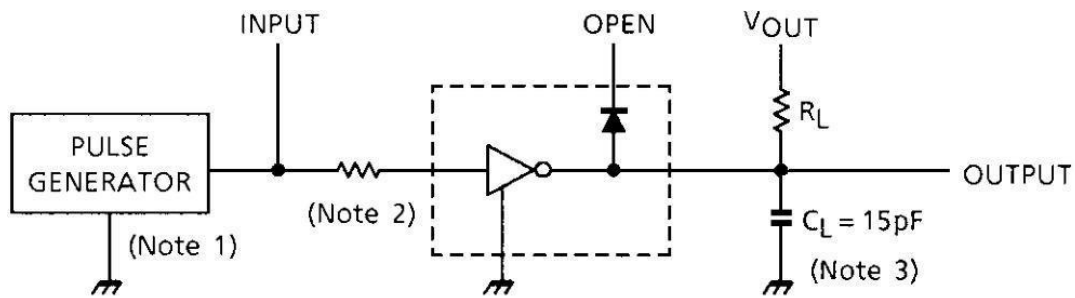
6. I_R



7. V_F



9. t_{ON}, t_{OFF}



Note 1: Pulse width 50 μ s, duty cycle 10%

Output impedance 50 Ω , $t_r \leq 5$ ns, $t_f \leq 10$ ns

Note 2: Input conditions are shown as following:

Type Number	R1	V_{IH}
XD62002	0	13 V
XD/XL62003	0	3 V
XD/XL62004	0	8 V

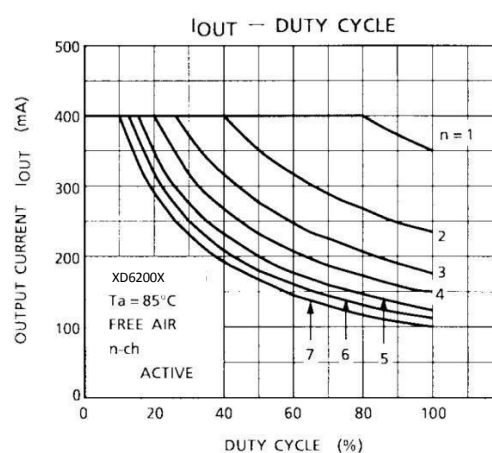
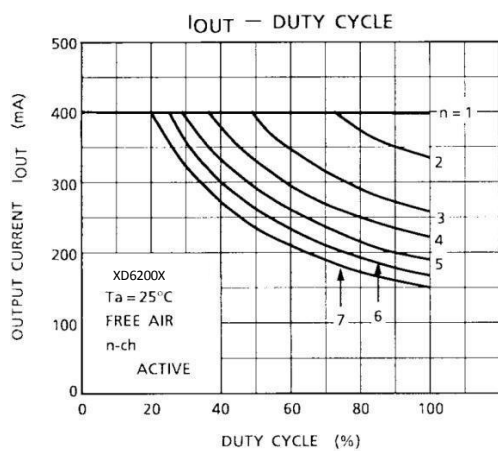
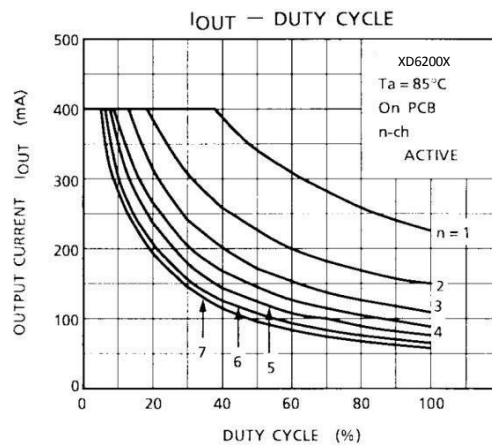
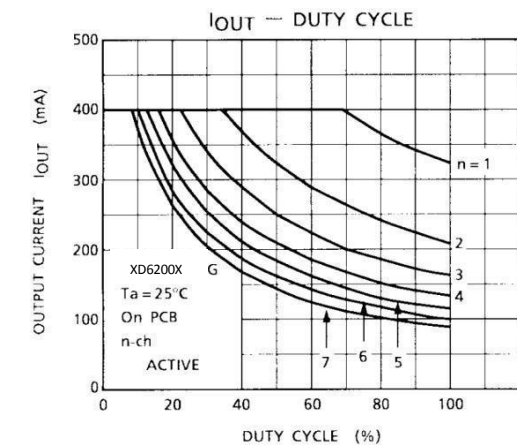
Note 3: C_L includes probe and jig capacitance.

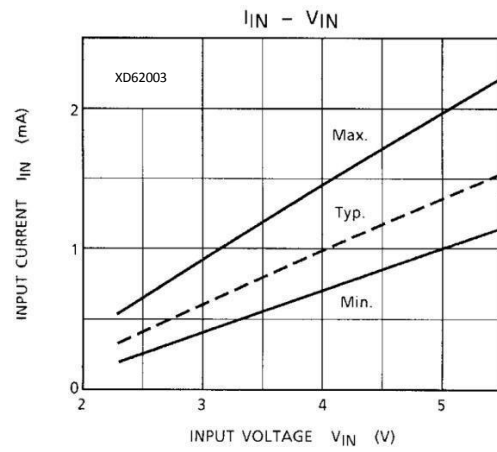
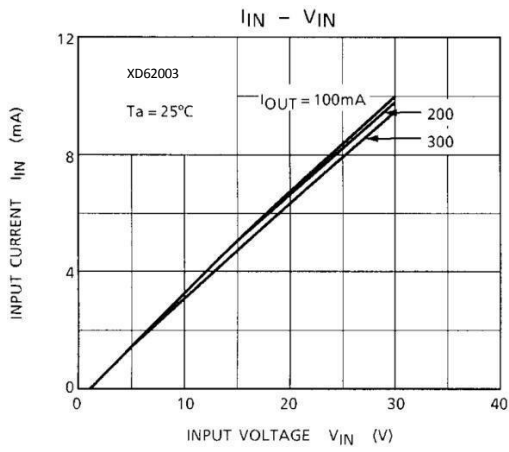
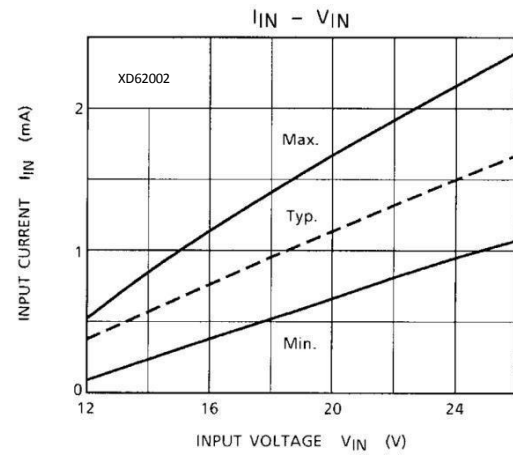
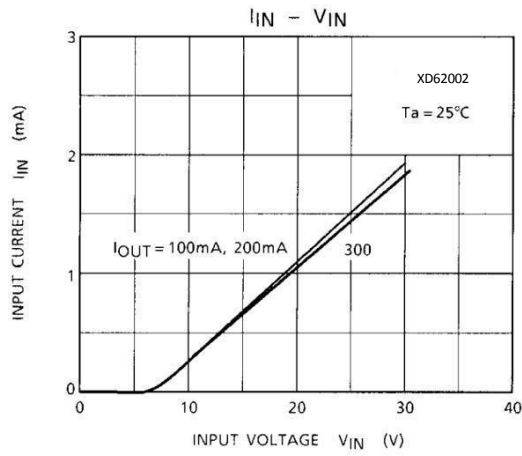
Precautions for Using

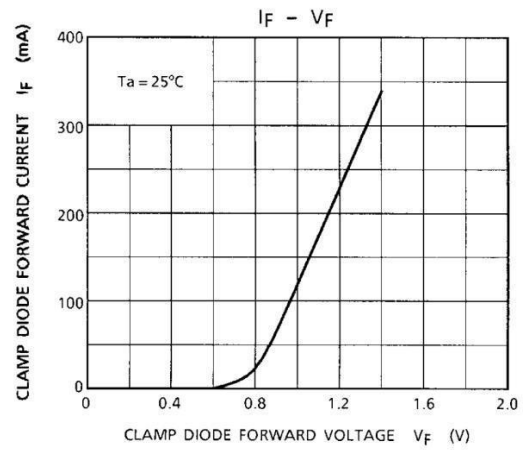
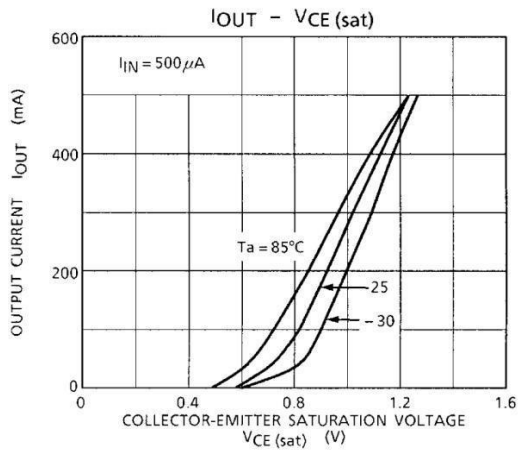
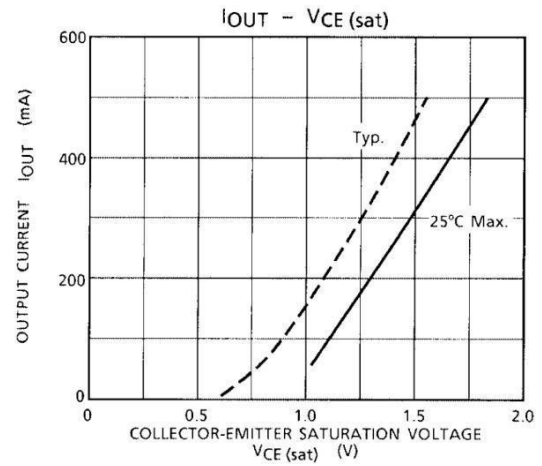
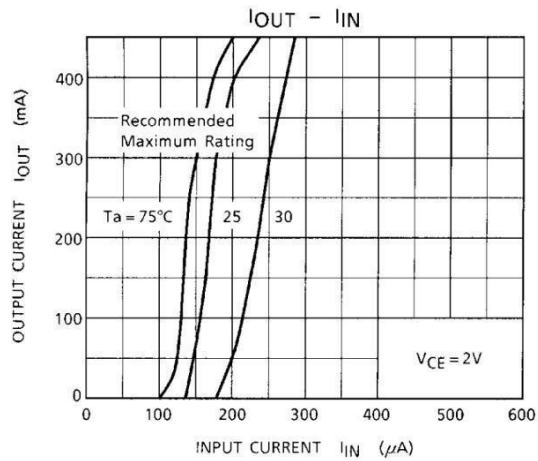
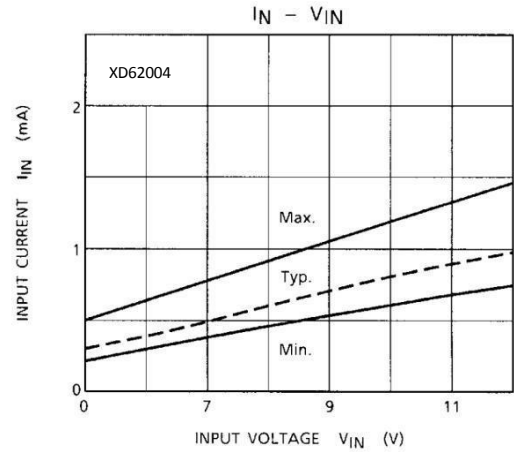
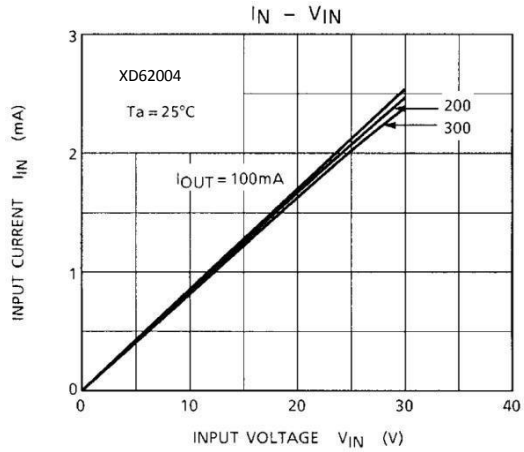
This IC does not include built-in protection circuits for excess current or overvoltage. If this IC is subjected to excess current or overvoltage, it may be destroyed.

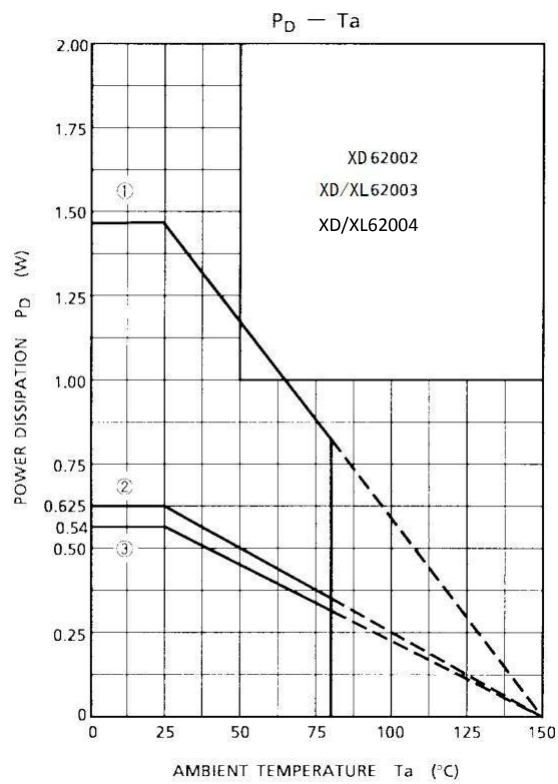
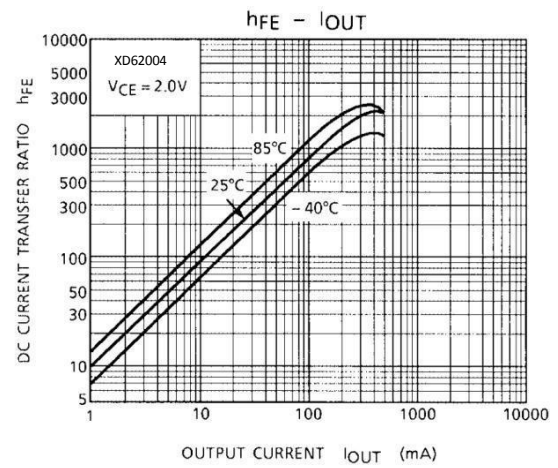
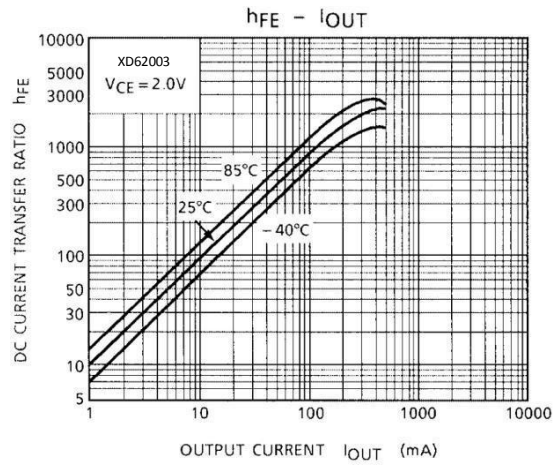
Hence, the utmost care must be taken when systems which incorporate this IC are designed.

Utmost care is necessary in the design of the output line, COMMON and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.









10. ORDERING INFORMATION

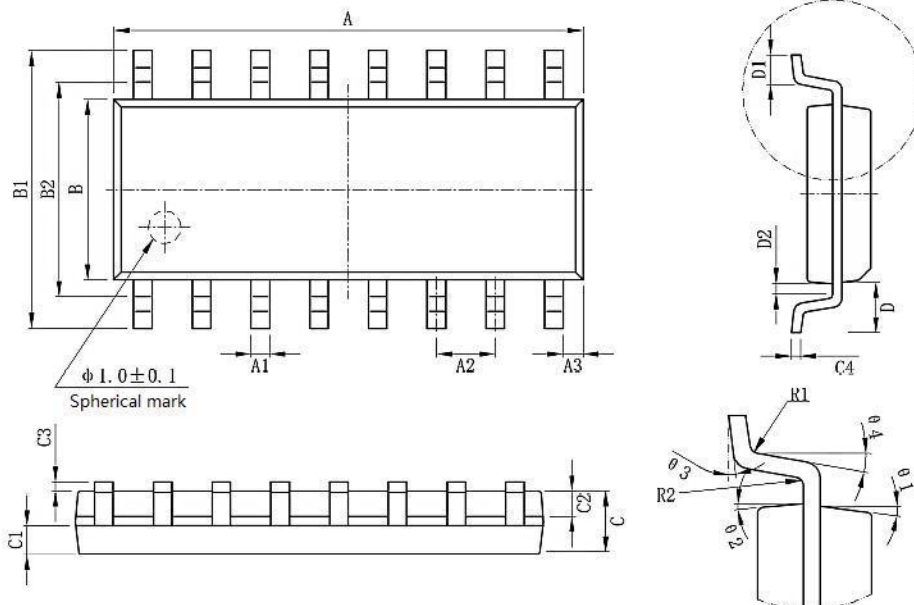
Ordering Information

Part Number	Device Marking	Package Type	Bodysize (mm)	Temperature (°C)	MSL	Transport Media	Package Quantity
XD62002	XD62002	DIP16	19.05 * 6.35	- 40 to +85	MSL3	Tube25	1000
XL62003	XL62003	SOP16	10.00 * 3.95	- 40 to +85	MSL3	T&R	2500
XD62003	XD62003	DIP16	19.05 * 6.35	- 40 to +85	MSL3	Tube25	1000
XL62004	XL62004	SOP16	10.00 * 3.95	- 40 to +85	MSL3	T&R	2500
XD62004	XD62004	DIP16	19.05 * 6.35	- 40 to +85	MSL3	Tube25	1000

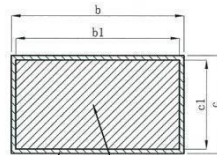
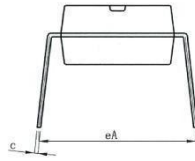
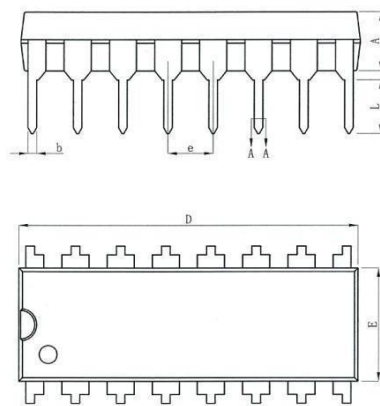
11. DIMENSIONAL DRAWINGS

SOP16

SYM MARK	MIN (mm)	MAX (mm)	SYM MARK	MIN (mm)	MAX (mm)
A	9.80	10.00	C4	0.203	0.233
A1	0.356	0.456	D	1.05TYP	
A2	1.27TYP		D1	0.40	0.70
A3	0.302TYP		D2	0.15	0.25
B	3.85	3.95	R1	0.20TYP	
B1	5.84	6.24	R2	0.20TYP	
B2	5.00TYP		θ 1	8° ~ 12° TYP4	
C	1.40	1.60	θ 2	8° ~ 12° TYP4	
C1	0.61	0.71	θ 3	0° ~ 8°	
C2	0.54	0.64	θ 4	4° ~ 12°	
C3	0.05	0.25			



DIP16



WITH PLATING — BASE METAL

symbol	millimeter		
	Min	Nom	Max
A	3.20	3.30	3.40
b	0.44	---	0.53
b1	0.43	0.46	0.49
c	0.25	---	0.30
c1	0.24	0.25	0.26
D	18.95	19.05	19.15
E	6.25	6.35	6.45
e	2.54BSC		
eA	8.30	8.80	9.30
L	3.00	---	---

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