

Features And Application

- 500-mA Rated Collector Current (Single Output)
- High-Voltage Outputs . . . 50 V
- Output Clamp Diodes
- Inputs Compatible With Various Types of Logic
- Relay Driver Applications

Description

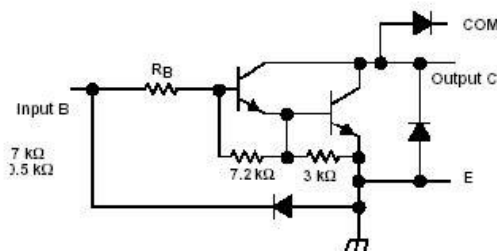
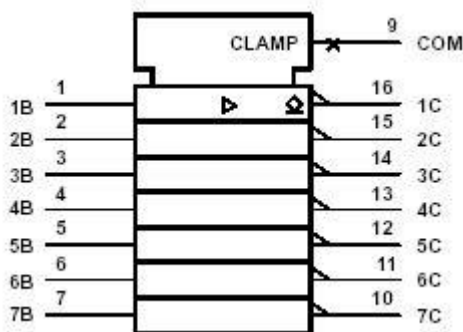
The CBM2004A are monolithic high-voltage, high-current Darlington transistor arrays. Each consists of seven n-p-n Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads.

The collector-current rating of a single Darlington pair is 500 mA.

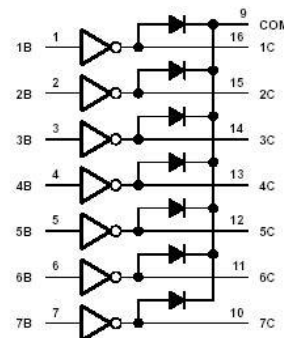
The Darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED and gas discharge), line drivers, and logic buffers.

The CBM2004A has a 10.5kΩ series base resistor for each Darlington pair for operation directly with 6-15V CMOS devices.

LOGIC SYMBOL



LOGIC DIAGRAM



SCHEMATICS (each Darlington Pair)

CBM2004: RB = 10.5kΩ

All resistor values shown are nominal.

Absolute Maximum Ratings (Ta =25°C)

Parameter	Symbol	Values	Unit
Collector-emitter voltage		50	V
Input voltage(see Note 1)	V _I	30	V
Peak collector current (see Figures 14 and 15)		500	mA
Output clamp current	I _{OK}	500	mA
Total emitter-terminal current		-2.5	A
Continuous total power dissipation		See Dissipation Rating Table	
Operating free-air temperature range	T _A	-40 to 85	°C
Storage temperature range	T _{stg}	-55 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds		260	°C

NOTE 1: All voltage values are with respect to the emitter/substrate terminal E, unless otherwise noted.

Dissipation Rating Table

PACKAGE	T _A =25°C	DERATING FACTOR	T _A =85°C
	POWER RATING	above T _A =25°C	POWER RATING
D	1210mW	7.6mW/°C	494mW
N	1420mW	9.2mW/°C	598mW

Electrical Characteristics, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

Symbol	Parameter	Test Fig.	Test Conditions	Min	Typ	Max	Unit
$V_{i(on)}$	Input Voltage	6	$V_{CE}=2V$ $I_C = 125mA$ $I_C = 200mA$ $I_C = 275mA$ $I_C = 350mA$			5 6 7 8	V
$V_{CE(sat)}$	Collector-emitter Saturation Voltage	5	$I_C = 100mA$ $I_B = 250mA$ $I_C = 200 mA$ $I_B = 350mA$ $I_C = 350 mA$ $I_B = 500mA$		0.9 1.1 1.3	1.1 1.3 1.6	V
I_{CEX}	Output Leakage Current	2	$V_{CE} = 50V, V_i = 1V$			500	μA
V_F	Clamp Diode Forward Voltage	8	$I_F = 350mA$		1.7	2	V
$I_{i(off)}$	Off-state Input Current	3	$V_{CE}=50V, T_{amb} = 70^\circ\text{C},$ $I_C = 500mA$	50	65		μA
I_i	Input Current	4	$V_i = 5V$ $V_i = 12V$		0.35 1	0.5 1.45	mA
I_R	Clamp Reverse Current	7	$V_R = 50V$ $T_{amb} = 70^\circ\text{C}, V_R = 50V$			50 100	μA
C_i	Input Capacitance				15	25	pF
Switching Characteristics, $T_A=25^\circ\text{C}$							
t_{PLH}	Turn-on Delay Time		See Fig.9		0.25	1	us
t_{PHL}	Turn-off Delay Time		See Fig.9		0.25	1	us
V_{OH}	High level output voltage after switching		$V_S=50V, I_O=300mA$ See Fig.10	V_S-20			mV

PARAMETER MEASUREMENT INFORMATION

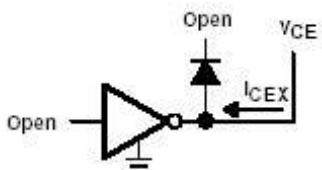


Figure 1. I_{CEX} Test Circuit

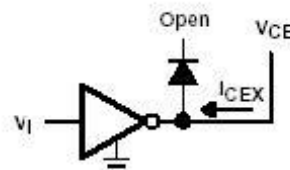


Figure 2. I_{CEX} Test Circuit

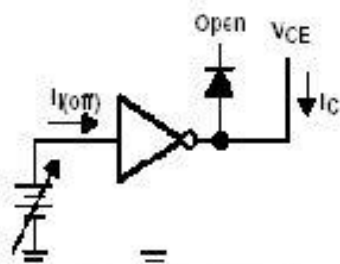


Figure 3. $I_{I(off)}$ Test Circuit

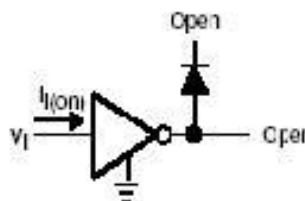
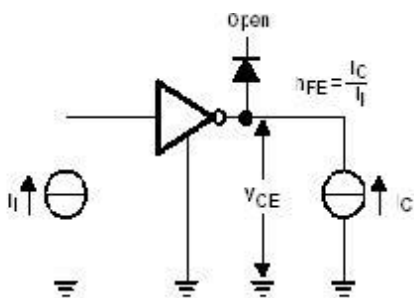


Figure 4. I_I Test Circuit



NOTE: I_I is fixed for measuring $V_{CE(sat)}$, variable for measuring h_{FE} .

Figure 5. h_{FE} , $V_{CE(sat)}$ Test Circuit

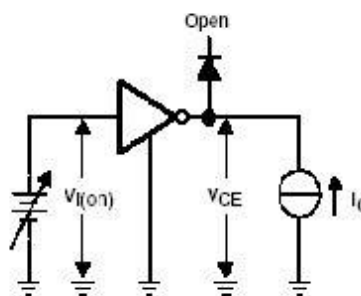


Figure 6. $V_{I(on)}$ Test Circuit

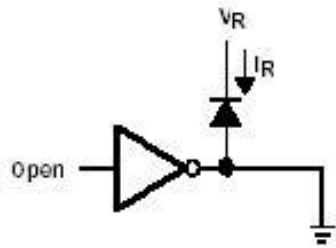


Figure 7. I_R Test Circuit

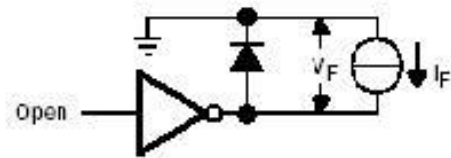


Figure 8. V_F Test Circuit

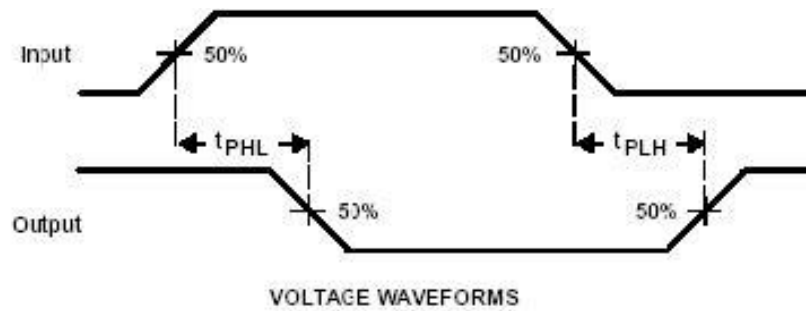


Figure 9. Propagation Delay-Time Waveforms

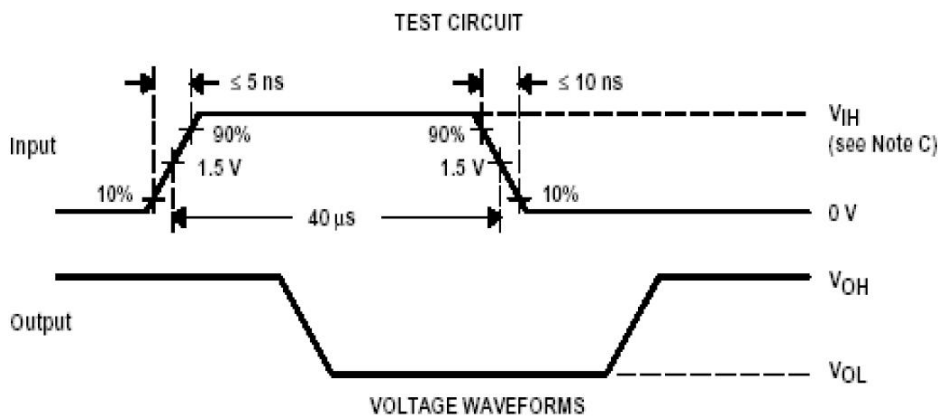


Figure 10. Latch-Up Test Circuit and Voltage Waveforms

- NOTES:** A. The pulse generator has the following characteristics: PRR = 12.5 kHz, $Z_O=50$.
 B. C_L includes probe and jig capacitance.
 C. $V_{IH} = 12$ V;

TYPICAL CHARACTERISTICS

**COLLECTOR-EMITTER
SATURATION VOLTAGE
VS
COLLECTOR CURRENT
(ONE DARLINGTON)**

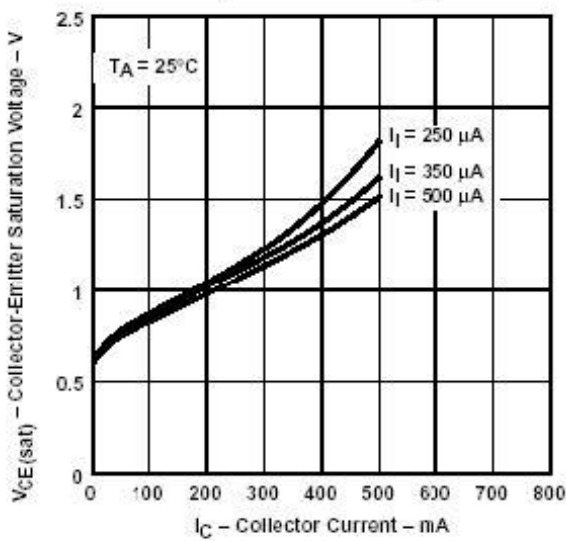


Figure 11

**COLLECTOR-EMITTER
SATURATION VOLTAGE
VS
TOTAL COLLECTOR CURRENT
TWO DARLINGTONS PARALLELED**

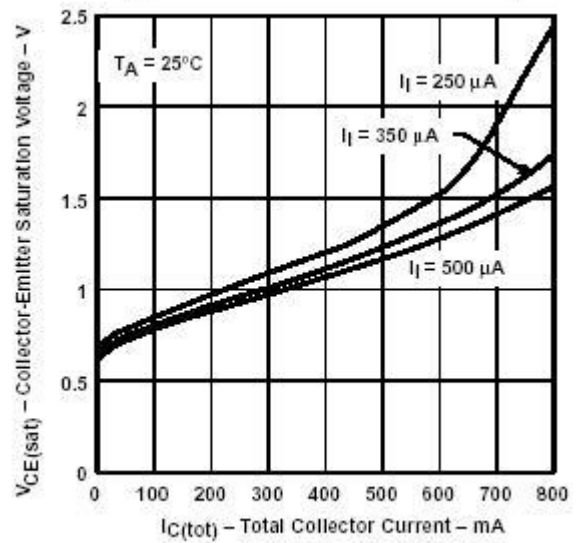


Figure 12

**COLLECTOR CURRENT
VS
INPUT CURRENT**

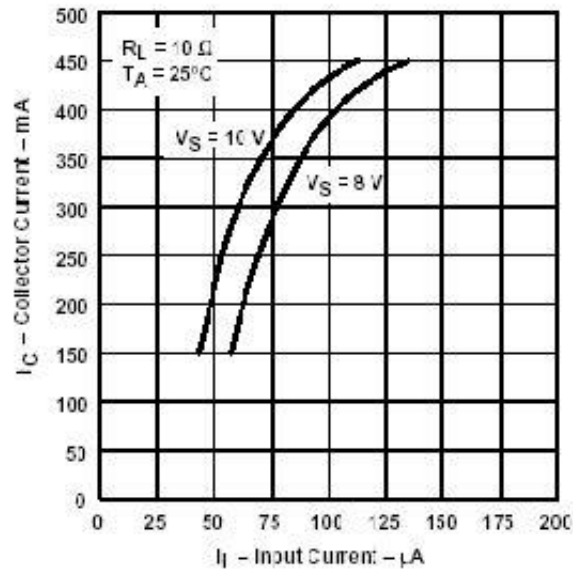


Figure 13

THERMAL INFORMATION

D PACKAGE
MAXIMUM COLLECTOR CURRENT
Vs
DUTY CYCLE

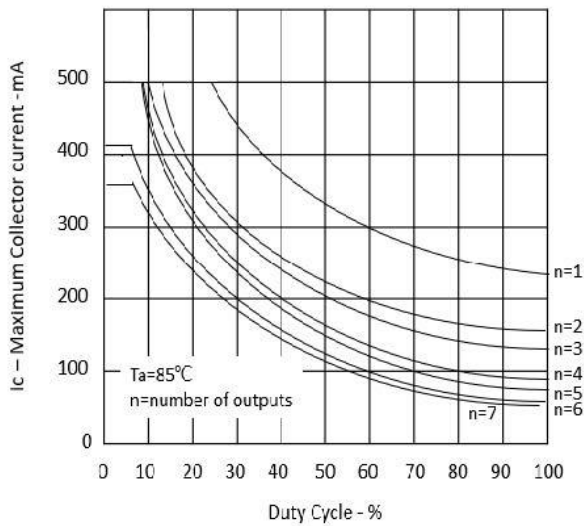


Figure 14

N PACKAGE
MAXIMUM COLLECTOR CURRENT
Vs
DUTY CYCLE

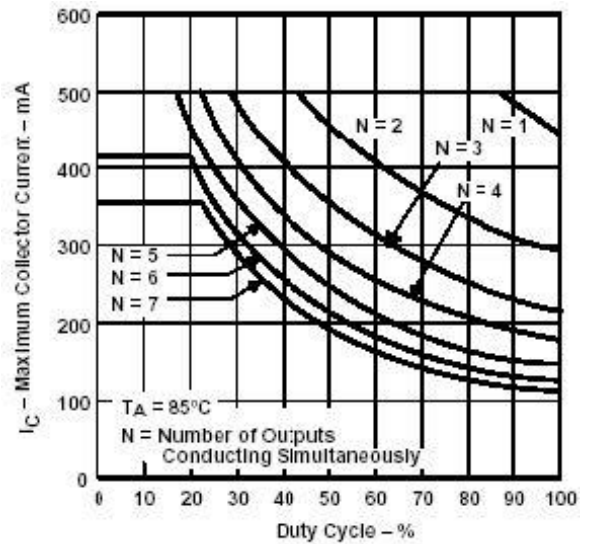


Figure 15

APPLICATION INFORMATION

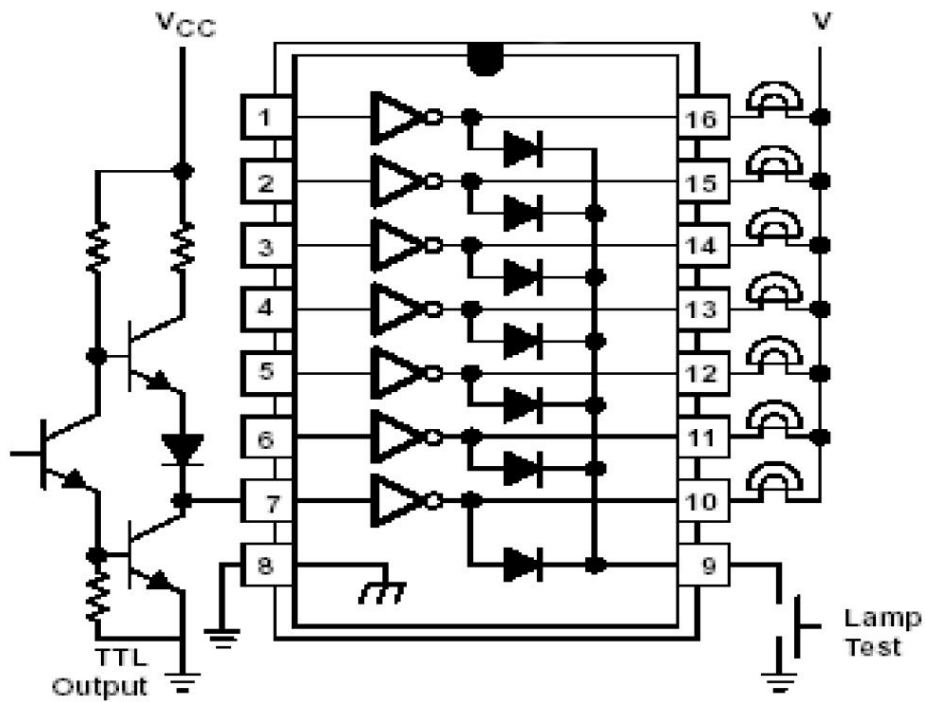


Figure 16. TTL to Load

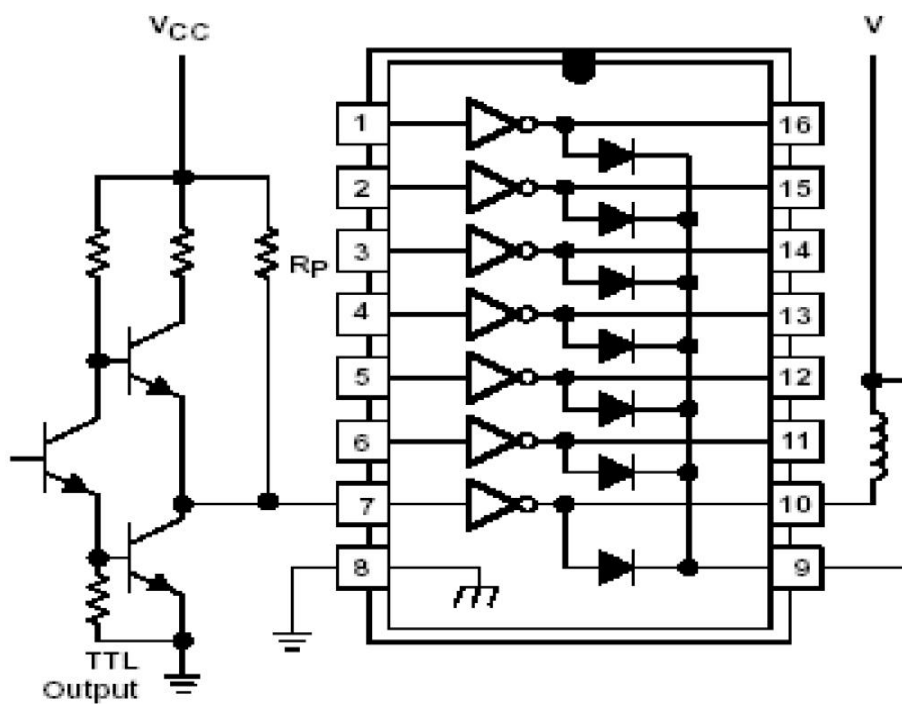
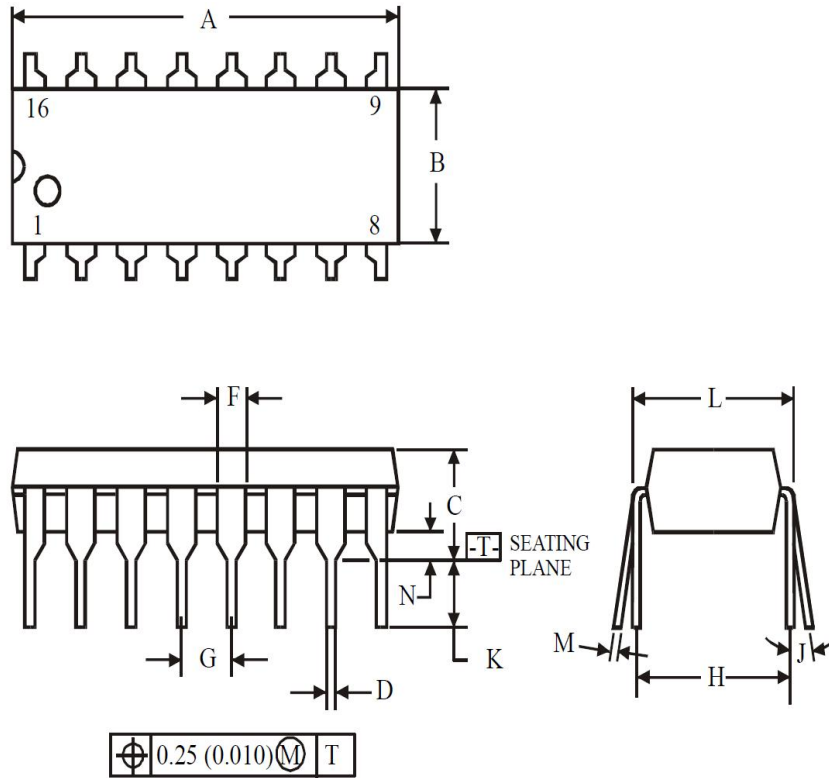


Figure 17. Use of Pullup Resistors to Increase Drive Current

Package Dimensions

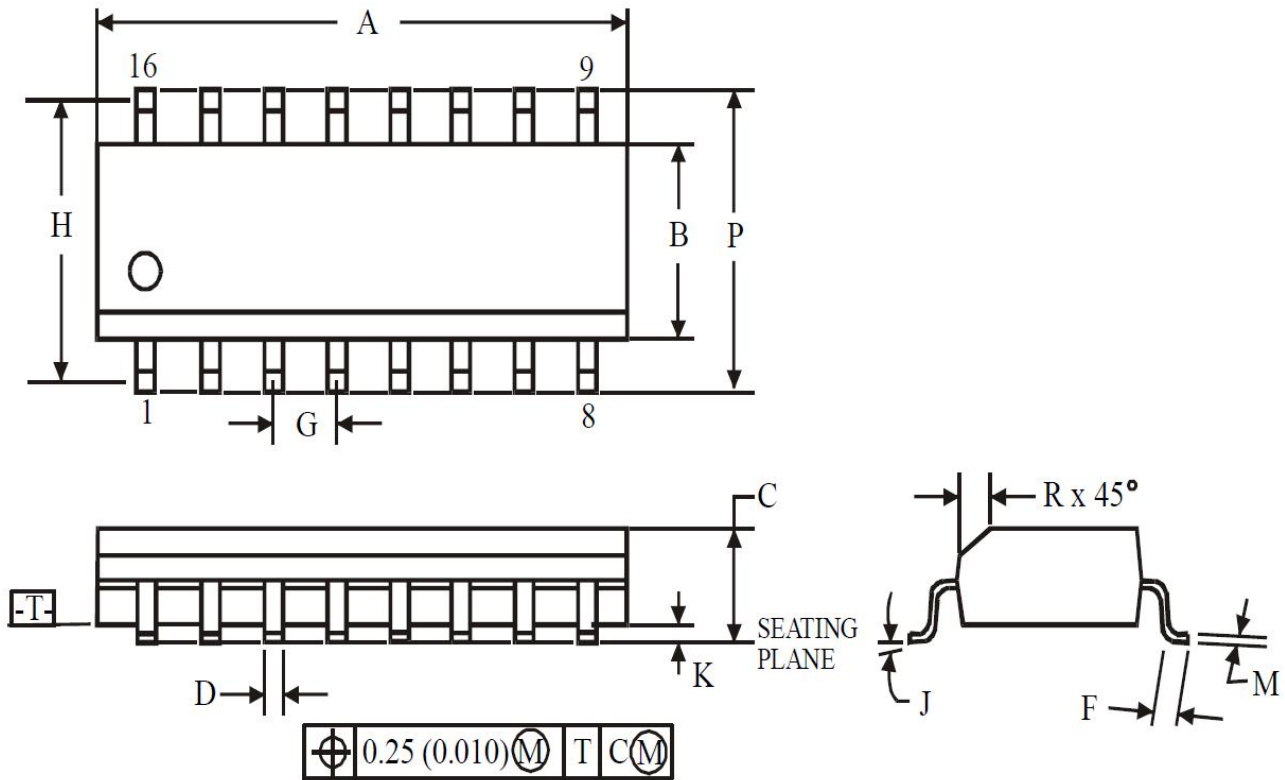
DIP-16



SYMBOL	MILLIMETER		SYMBOL	MILLIMETER	
	MIN	MAX		MIN	MAX
A	18.67	19.69	H	7.62	
B	6.10	7.11	J	0°	10°
C		5.33	K	2.92	3.81
D	0.36	0.56	L	7.62	8.26
F	1.14	1.78	M	0.20	0.36
G	2.54		N	0.38	

- NOTES:**
1. Dimensions "A" , "B" do not include mold flash or protrusions.
 2. Maximum mold flash or protrusions 0.25 mm (0.010) per side.

SOP-16



SYMBOL	MILLIMETER		SYMBOL	MILLIMETER	
	MIN	MAX		MIN	MAX
A	9.80	10.00	H	5.72	
B	3.80	4.00	J	0°	8°
C	1.35	1.75	K	0.10	0.25
D	0.33	0.51	M	0.19	0.25
F	0.40	1.27	P	5.80	6.20
G	1.27		R	0.25	0.50

- NOTES:**
1. Dimensions A and B do not include mold flash or protrusion.
 2. Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B - 0.25 mm (0.010) per side.

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING	TEMPRANGE	PACKAGE	PAKEAGE	TRANSPOT
CBM2004	CBM2004AS	-40°C~85°C	SOP-16	CBM2004AS	Tape and Reel,2500
CBM2004	CBM2004AIP	-40°C~85°C	DIP-16	CBM2004AIP	Tape and Reel,50