



偉詮電子股份有限公司
Weltrend Semiconductor, Inc.

WT6703F

Product Description

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1. General Description

The WT6703F is a low power consumption and low cost microcontroller for system power manager with 1) Turbo 8051 compatible (3T) CPU, 2) 8051 2 timers and UART, 3) 8K bytes flash memory, 4) 384 bytes SRAM, 5) 2 8-bit PWMs, 6) DPMS detector, 7) Two Slave I²C interface, 8) 4 channel 8-bit A/D converter, 9) Hardware CEC, 10) Real Time Clock, 11) watch-dog timer, 12) Power down mode, 13) Embedded ISP, 14) Embedded ICE mode.

1.1. Features

- Embedded turbo 8051 CPU
 - Normal operation mode : 12MHz, 6MHz, 2MHz, 1MHz
 - Stand by mode : 32KHz
 - Instruction execution time : Min. =250ns at 12Mhz
- Memory :
 - Flash memory: 8K Bytes
 - RAM: 384 Bytes (include 128bytes H/W DDC SRAM)
- 2 8051 timers: Timer0, Timer1
- 1 8051 UART, support baud rate 115200 – 1200 at RC oscillator =12MHz
- Sync processor for monitoring DPMS (VGA connector) wake up signal
- 8-bit A/D converter with 4 selectable inputs, shared with IO pin
- Tri-state I/O structure, Input state can decided by external resistor (pull high or pull low)
- 2 PWM pin output
- 1 DDC/CI interface
- 1 slave mode IIC interface
- Universal IR Receiver
- Watch Dog timer
- Low voltage reset
- 32.768KHz crystal Oscillator & build-in RC Oscillator
- Build-in RTC
- Maximum 22 programmable IO pins
 - 22-IO: 28 pin package
 - 18-IO: 24 pin package
 - 14-IO: 20 pin package
 - 11-IO: 16 pin package
- Power consumption :
 - Typical 8mA at 12Mhz mode
 - Typical 4mA at 2Mhz mode
 - Typical 2mA at low speed mode(32KHz)
- Operating voltage range : 3.6V – 3.0V
- Package:
 - SOP16
 - SSOP20
 - SOP24/SSOP24
 - SSOP28

1.2. Application

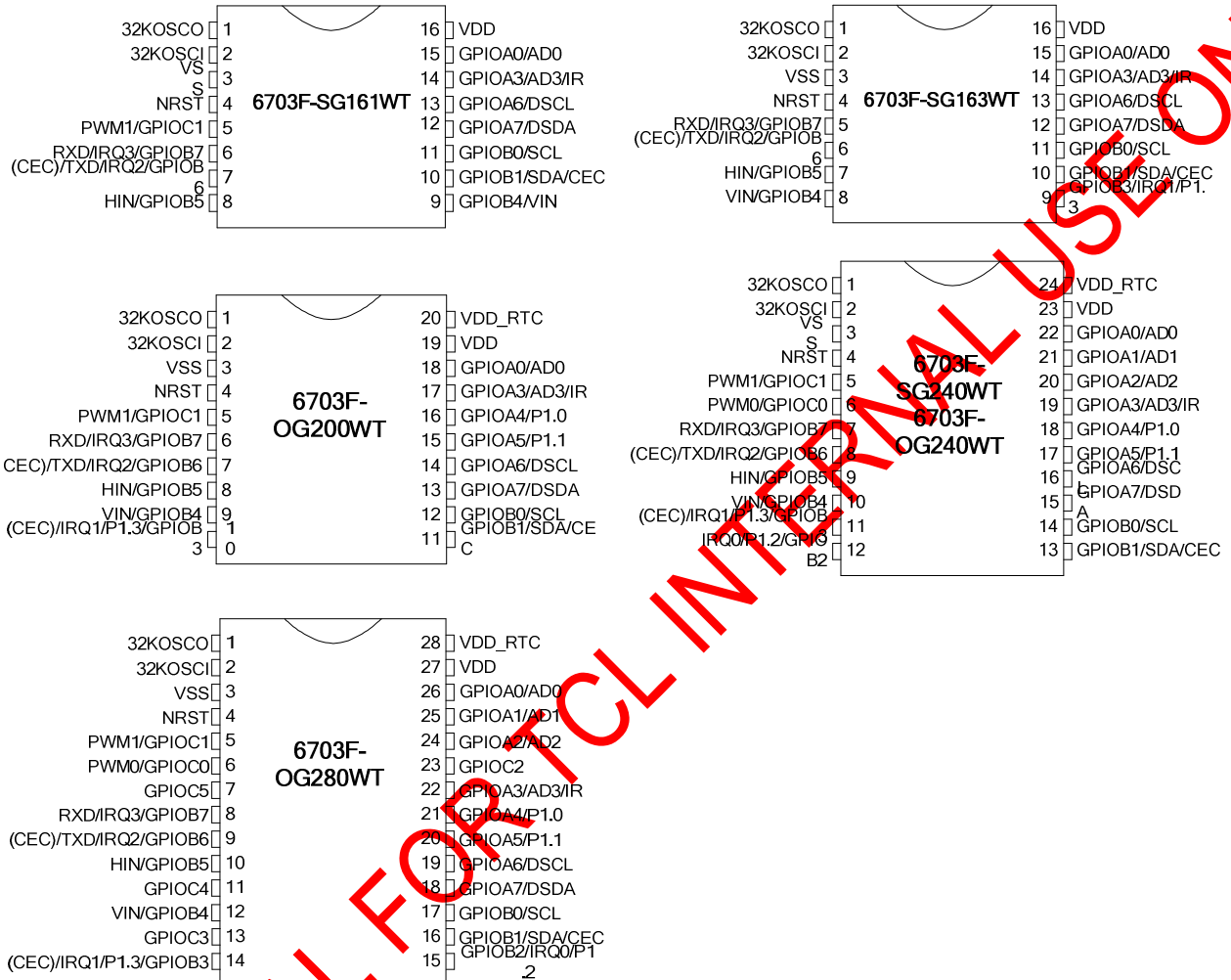
- Display system power management MCU with RTC.
- I/O expander with RTC and ADC.



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2. Pin Assignment

2.1. Package Type



Package Type	Package Outline	Part Number	Packing
SOP 16 pin	150mil	6703F-SG161WT	Tube or Tape & Reel
SOP 16 pin	150mil	6703F-SG163WT	Tube or Tape & Reel
SSOP 20 pin	150mil	6703F-OG200WT	Tube or Tape & Reel
SOP 24 pin	300mil	6703F-SG240WT	Tube or Tape & Reel
SSOP 24 pin	150mil	6703F-OG240WT	Tube or Tape & Reel
SSOP 28 pin	150mil	6703F-OG280WT	Tube or Tape & Reel



2.2. Pin Description

O280	S240 O240	O200	S161	S163	Pin Name	I/O	Function Description
27	23	19	16	16	VDD	PWR	Power 3.3V
28	24	20	16	16	VDD_RTC	PWR	RTC Power ($\leq$ VDD)
1	1	1	1	1	32KOSCO	O	32kHz oscillator output
2	2	2	2	2	32KOSCI	I	32kHz oscillator input
3	3	3	3	3	VSS	GND	Ground
4	4	4	4	4	NRST	I	Reset pin, active low (internal pull high)
5	5	5	5		GPIOC1	I/O	PWM1 output. Shared with GPIO C1
6	6				GPIOC0	I/O	PWM0 output. Shared with GPIO C0
7					GPIOC5	I/O	GPIO C5
8	7	6	6	5	GPIOB7	I/O	8051 UART RXD or external IRQ3 interrupt input. Shared with GPIO B7
9	8	7	7	6	GPIOB6	I/O	(CEC) or 8051 UART TXD or external IRQ2 interrupt input. Shared with GPIO B6
10	9	8	8	7	GPIOB5	I/O	HIN input. Shared with GPIO B5
11					GPIOC4	I/O	GPIO C4
12	10	9	9	8	GPIOB4	I/O	VIN input. Shared with GPIO B4
13					GPIOC3	I/O	GPIO C3
14	11	10		9	GPIOB3	I/O	(CEC) or 8051 P1.3 or external IRQ1 interrupt input. Shared with GPIO B3
15	12				GPIOB2	I/O	8051 P1.2 or external IRQ0 interrupt input. Shared with GPIO B2
16	13	11	10		GPIOB1	I/O	CEC or slave IIC SDA2 Shared with GPIO B1
17	14	12	11	10	GPIOB0	I/O	Slave IIC SCL2 Shared with GPIO B0
18	15	13	12	11	GPIOA7	I/O	DDC SDA Shared with GPIO A7
19	16	14	13	12	GPIOA6	I/O	DDC SCL Shared with GPIO A6
20	17	15			GPIOA5	I/O	8051 P1.1. Shared with GPIO A5
21	18	16			GPIOA4	I/O	8051 P1.0. Shared with GPIO A4
22	19	17	14	13	GPIOA3	I/O	Key pad ADC input3 or IR detector input. Shared with GPIO A3
23					GPIOC2	I/O	GPIO C2
24	20				GPIOA2	I/O	Key pad ADC input2. Shared with GPIO A2
25	21				GPIOA1	I/O	Key pad ADC input1. Shared with GPIO A1
26	22	18	15	14	GPIOA0	I/O	Key pad ADC input0. Shared with GPIO A0

(a) All GPIOs have Schmitt trigger input.

(b) When use CEC, Slave IIC, 8051 P1.x or UART, the external circuit needs pull high.

(c) GPIOA3, GPIOA2, GPIOA1, GPIOA0 MAX input are +3.6v(=3.3v+0.3v)

and the other GPIOs MAX input is +5.5v(=5.0v+0.5v)

(d) CEC pin shared with GPIOB1/GPIOB3/GPIOB6 depends on CEC_IO_SLT[1:0] (Index 0EH-bit 6:5)

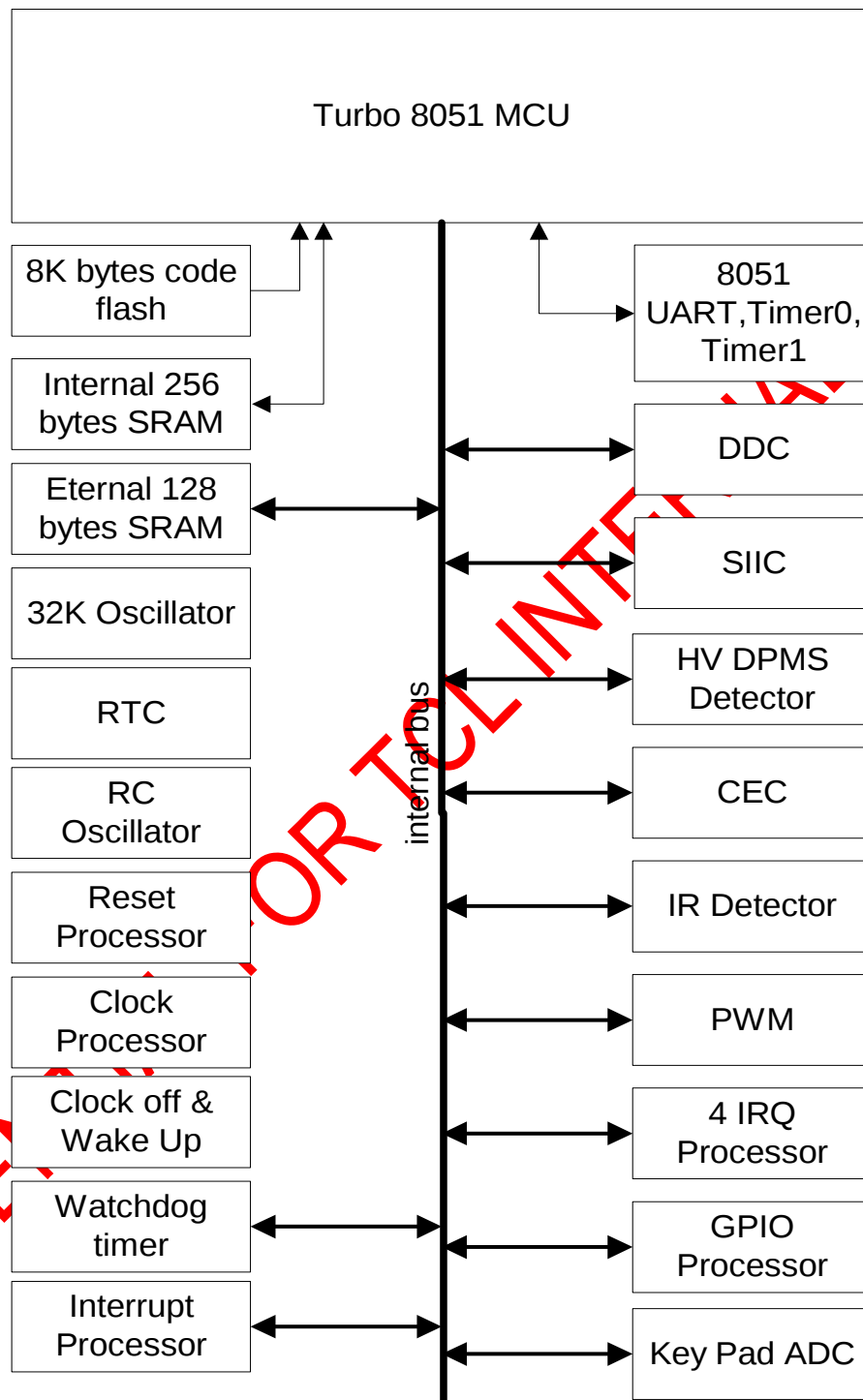


3. Selection Guide

Part NO.	6703F-OG280WT	6703F-OG240WT/SG240WT	6703F-OG200WT	6703F-SG161WT	6703F-SG163WT
DPMS Detection	V	V	V	V	V
UART	V	V	V	V	V
8K Flash Memory	V	V	V	V	V
RAM 256 Byte	V	V	V	V	V
PWM Output	2	2	1	1	0
Slave I ² C	1	1	1	1	1
DDC/CI	1	1	1	1	1
RTC	V	V	V	V	V
CEC	V	V	V	V	V
IO	22max	18max	14max	11 max	11 max
Oscillator	32KHz Crystal/ RC OSC	32KHz Crystal/ RC OSC	32KHz Crystal/ RC OSC	32KHz Crystal/ RC OSC	32KHz Crystal/ RC OSC
8-bit ADC	4 selectable inputs	4 selectable inputs	2 selectable inputs	2 selectable inputs	2 selectable inputs
Power	3.3V	3.3V	3.3V	3.3V	3.3V
Package	28-pin SSOP	24-pin SSOP/SOP	20-pin SSOP	16-pin SOP	16-pin SOP



4. Functional Block Diagram





5. Electrical Characteristics

5.1. Absolute Maximum Ratings

Parameter	Min.	Max.	Units
DC Supply Voltage (VDD)	-0.3	3.6	V
Storage temperature	-25	125	°C
Operating temperature	-10	70	°C

*Note: Stresses above those listed may cause permanent damage to the devices

5.2. Recommended Operating Condition

Parameter	Min.	Typ.	Max.	Unit
3.3v Power supply (VDD)	3.0	3.3	3.6	V
RTC Power (VDD_RTC)	1.8	3.3	≤ VDD	V

5.3. Power Supply (VDD=3.3v)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
I _{VDD12M}	Normal operation current at 12Mhz operating	No load on output		8		mA
I _{VDD2M}	Normal operation current at 2Mhz operating	No load on output		4		mA
I _{VDD32K}	Normal operation current at 32Khz operating	No load on output		2		mA
I _{VDDS}	Standby current	No load on output		100		uA

5.4. I/O DC Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V _{T+}	Schmitt trigger Low-to-High threshold point		2.0		5.5	V
V _{T-}	Schmitt trigger High-to-Low threshold point				1	V
V _{OH}	Output high voltage	I _{OH} = 4mA	2.6			V
V _{OL}	Output low voltage(Note b)	I _{OL} = 4mA			0.4	V
V _{OH}	Output high voltage (GPIOC0~GPIOC1)	I _{OH} = 8mA	2.6			V
V _{OL}	Output low voltage (GPIOC0~GPIOC1)	I _{OL} = 8mA			0.4	V
I _{OZ}	Tri-state leakage current	V _O = 0 or 3.3V			±1	μA
R _{P0}	Pull up resistor			50		KΩ

(a) GPIOA3, GPIOA2, GPIOA1, GPIOA0 MAX input are +3.6v(=3.3v+0.3v) and the other GPIOs MAX input is +5.5v(=5.0v+0.5v)

(b) Including GPIOA0~GPIOA7, GPIOB0~GPIOB6

5.5. Low VDD Reset

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V _{LVD}	Low VDD Reset Threshold Voltage			2.7		V



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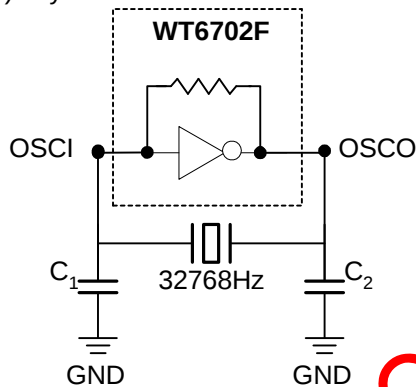
5.6. RC Oscillator

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_{RC}	RC frequency (@VDD=3.3V)			12		Mhz
$\Delta F_{RC}/F_{RC}$	Frequency tolerance	w/o Crystal oscillator calibration		± 5		%
		With Crystal oscillator calibration			± 2	%

5.7. Crystal oscillator

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_O	Frequency range			32.768		KHz
C_L	Load capacitance			12.5		pF
C_1/C_2	External capacitance (1)		22		30	pF
$\Delta F/F_O$	Frequency tolerance	At 25°C		30		ppm
$\Delta F/F_O$	Frequency shift (2)	-10°C ~ 70°C		+10 -100		ppm

(1) Crystal oscillator circuit



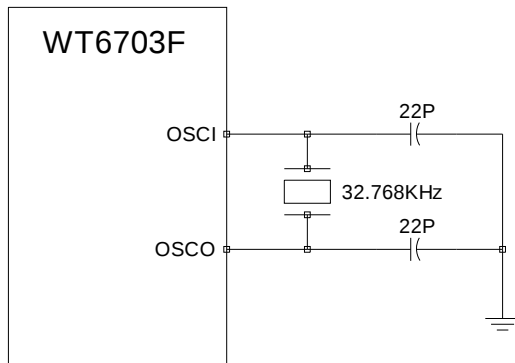
5.8. RTC Operating Current

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
I_{DDRTC}	Operating current	@2.6V		1.6		μA
I_{DDRTC}	Operating current	@1.8V		1.45		μA

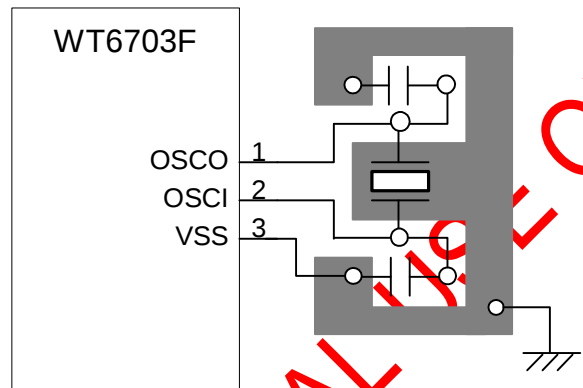


6. Typical Application Circuit

6.1. Crystal Oscillator

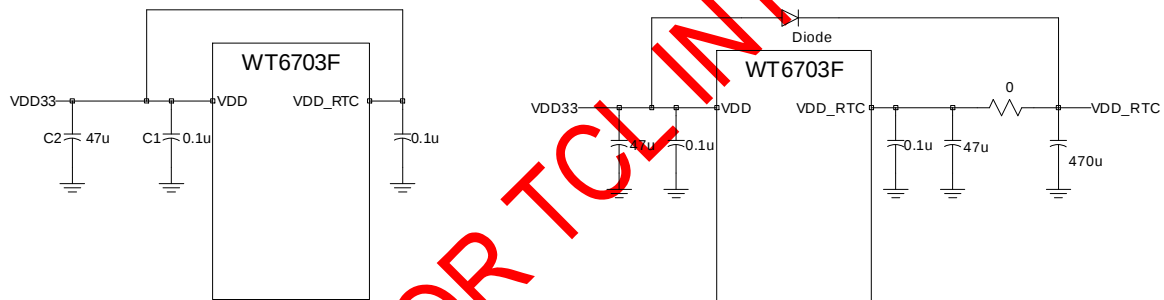


Oscillator Connections



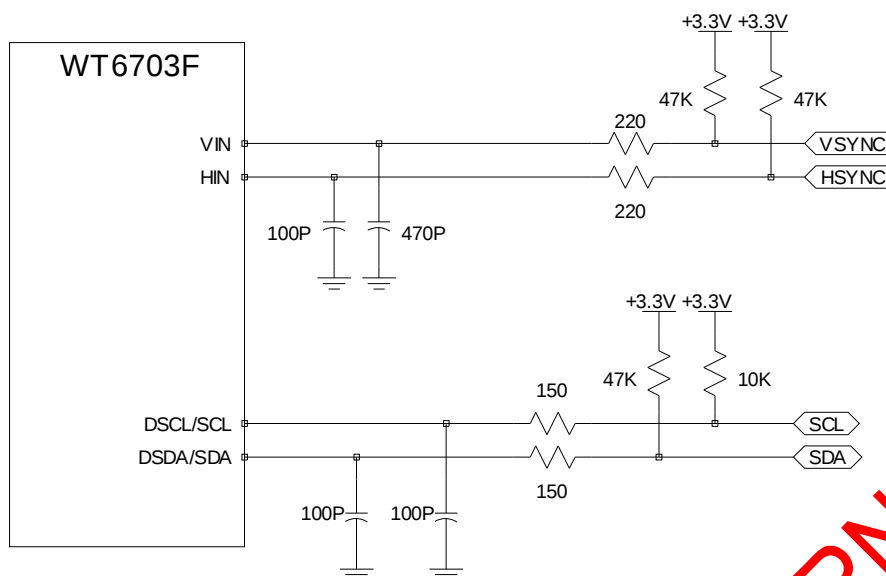
Layout of Oscillator PCB circuit

6.2. VDD pin



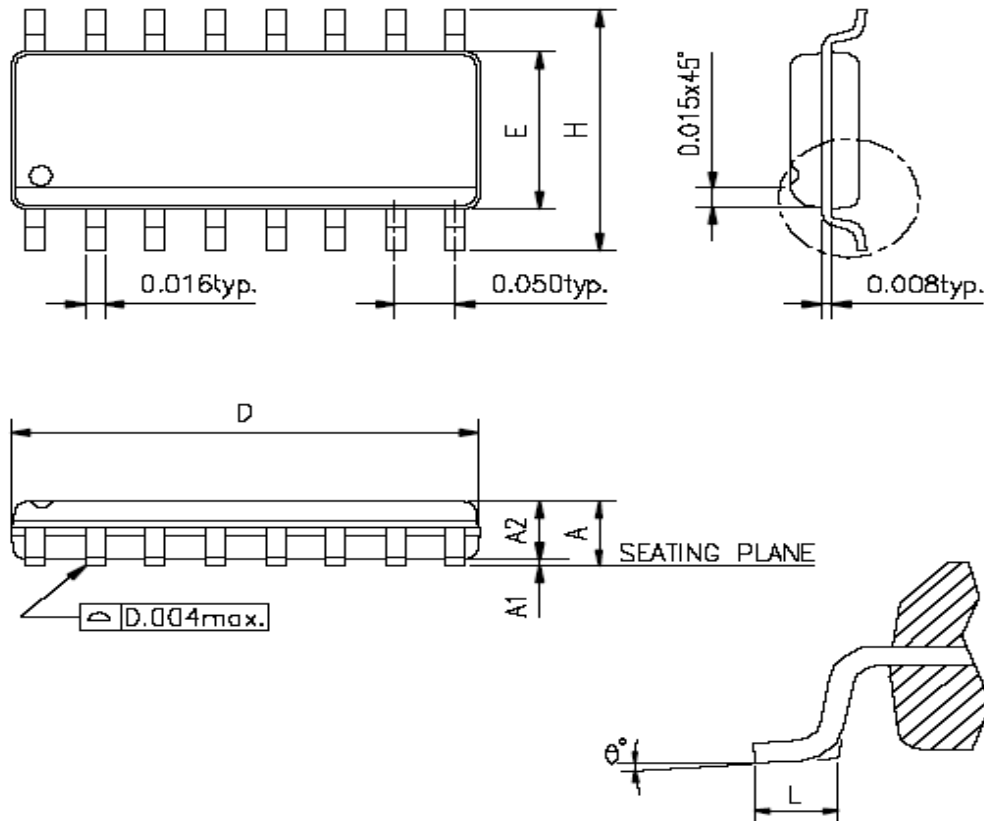


6.3. Hsync, Vsync and IIC interface protection



7. Package Information

7.1. SOP 16 Pin (150mil) Outline Dimensions



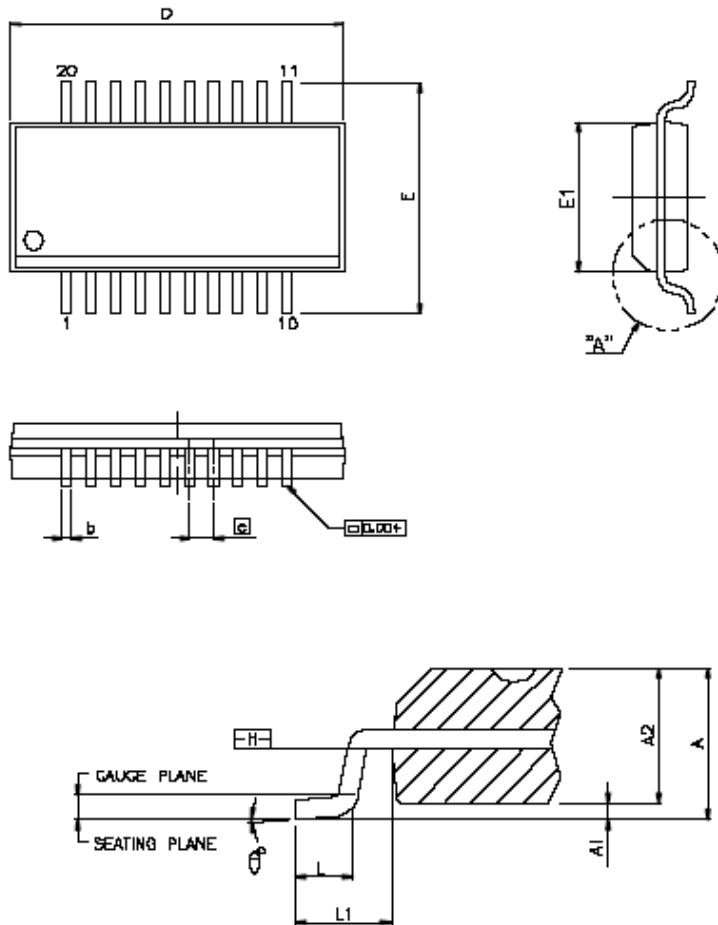
SYMBOLS	MIN.	MAX.
A	0.053	0.069
A1	0.004	0.010
D	0.386	0.394
E	0.150	0.157
H	0.228	0.244
L	0.016	0.050
θ	0	8

UNIT : INCH

NOTES:

1. JEDEC OUTLINE : MS-012 AC
2. DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .15mm (.006in) PER SIDE.
3. DIMENSIONS "E" DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .25mm (.010in) PER SIDE.

7.2. SSOP 20 Pin (150mil) Outline Dimensions



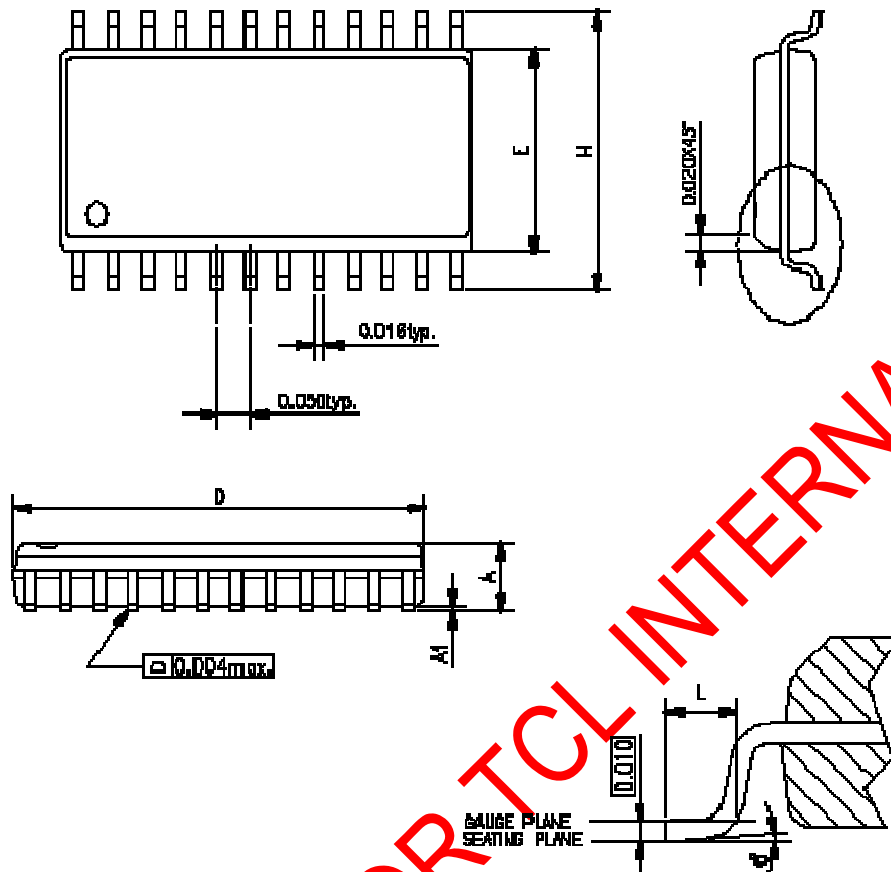
SYMBOLS	MIN.	NOM.	MAX.
A	0.053	0.064	0.069
A1	0.004	0.006	0.010
A2	—	—	0.059
b	0.008	—	0.012
c	0.007	—	0.010
D	0.337	0.341	0.344
E	0.228	0.236	0.244
E1	0.150	0.154	0.157
e	0.025 BASIC		
L	0.018	0.025	0.050
L1	0.041 BASIC		
θ°	0°	—	8°

UNIT : INCH

NOTES:

1. JEDEC OUTLINE : MO-137 AD
2. DIMENSION D DOES NOT INCLUDE MOLD PROTRUSIONS OR GATE BURRS. MOLD PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.006" PER SIDE. DIMENSION E1 DOES NOT INCLUDE INTERLEAD MOLD PROTRUSIONS. INTERLEAD MOLD PROTRUSIONS SHALL NOT EXCEED 0.010" PER SIDE.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.004" TOTAL IN EXCESS OF b DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR INTRUSION SHALL NOT REDUCE DIMENSION b BY MORE THAN 0.002" AT LEAST.

7.3. SOP 24 Pin (300mil) Outline Dimensions



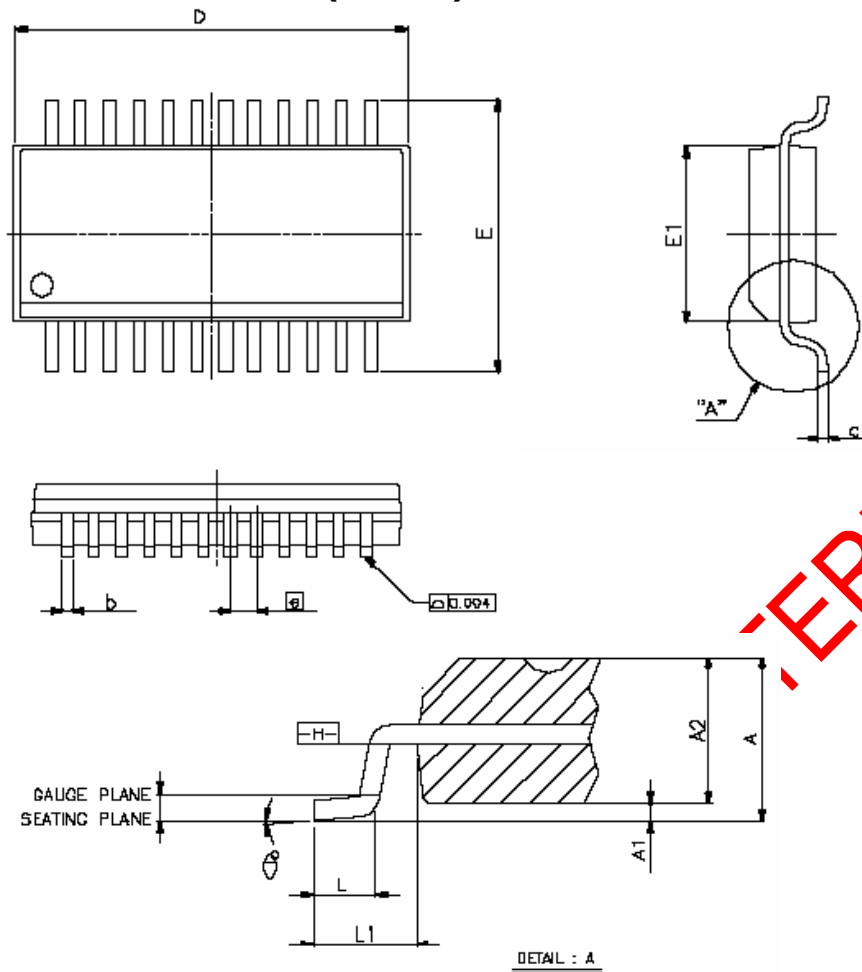
SYMBOLS	MIN.	NOM	MAX.
A	0.083	0.099	0.104
A1	0.004	—	0.012
D	0.599	0.600	0.614
E	0.291	0.295	0.299
H	0.394	0.406	0.419
L	0.016	0.035	0.050
P	0	—	8

UNT : INCH

NOTES:

1. JEDEC OUTLINE : MS-013 AD
2. DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .15mm (.006in) PER SIDE.
3. DIMENSIONS "E" DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .25mm (.010in) PER SIDE.

7.4. SSOP 24 Pin (150mil) Outline Dimensions



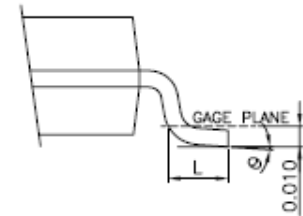
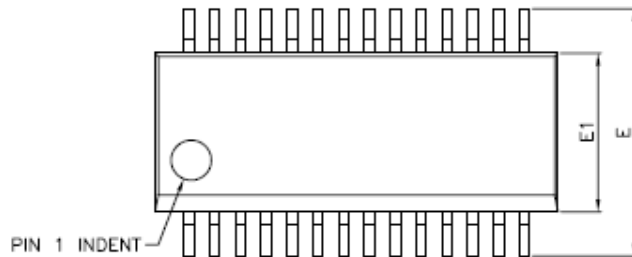
SYMBOLS	MIN.	NOM.	MAX.
A	—	0.064	0.070
A1	0.004	—	—
A2	—	—	0.059
b	0.008	—	0.012
c	0.006	—	0.010
D	0.335	0.341	0.346
E	0.228	0.236	0.244
E1	0.150	0.154	0.157
e	0.020	0.025	0.030
L	0.016	0.025	—
L1	—	0.041	—
0°	0°	—	8°

UNIT : INCH

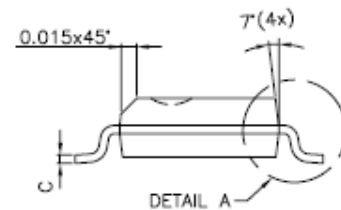
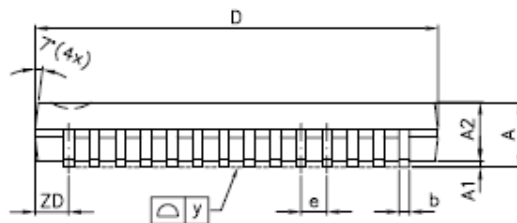
NOTES:

1. DIMENSION D DOES NOT INCLUDE MOLD PROTRUSIONS OR GATE BURRS. MOLD PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.006" PER SIDE. DIMENSION E1 DOES NOT INCLUDE INTERLEAD MOLD PROTRUSIONS. INTERLEAD MOLD PROTRUSIONS SHALL NOT EXCEED 0.010" PER SIDE.
2. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.004" TOTAL IN EXCESS OF b DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR INTRUSION SHALL NOT REDUCE DIMENSION b BY MORE THAN 0.002" AT LEAST.

7.5. SSOP 28 Pin (150mil) Outline Dimensions



DETAIL A



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	—	0.25	0.004	—	0.010
A2	1.37	1.45	1.52	0.054	0.057	0.060
b	0.23	0.25	0.36	0.009	0.010	0.014
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	9.80	9.91	10.01	0.386	0.390	0.394
E	5.79	5.99	6.20	0.228	0.236	0.244
E1	3.81	3.91	3.99	0.150	0.154	0.157
e	—	0.635	—	—	0.025	—
L	0.38	0.71	1.27	0.015	0.028	0.050
ZD	—	0.825	—	—	0.0325	—
y	—	—	0.076	—	—	0.003
θ	0°	—	8°	0°	—	8°

NOTE :

1. CONTROLLING DIMENSION : INCH
2. LEAD FRAME MATERIAL : COPPER 194
3. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, TIE BAR BURRS AND GATE BURRS. MOLD FLASH, TIE BAR BURRS AND GATE BURRS SHALL NOT EXCEED 0.006[0.15mm] PER END. DIMENSION "E1" DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010[0.25mm] PER SIDE.
4. DIMENSION "b" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.003[0.08mm] TOTAL IN EXCESS OF THE "b" DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADII OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD TO BE 0.0028[0.07mm]
5. TOLERANCE : ±0.010[0.25mm] UNLESS OTHERWISE SPECIFIED.
6. OTHERWISE DIMENSION FOLLOW ACCEPTABLE SPEC.
7. REFERENCE DOCUMENT : JEDEC SPEC MO-137

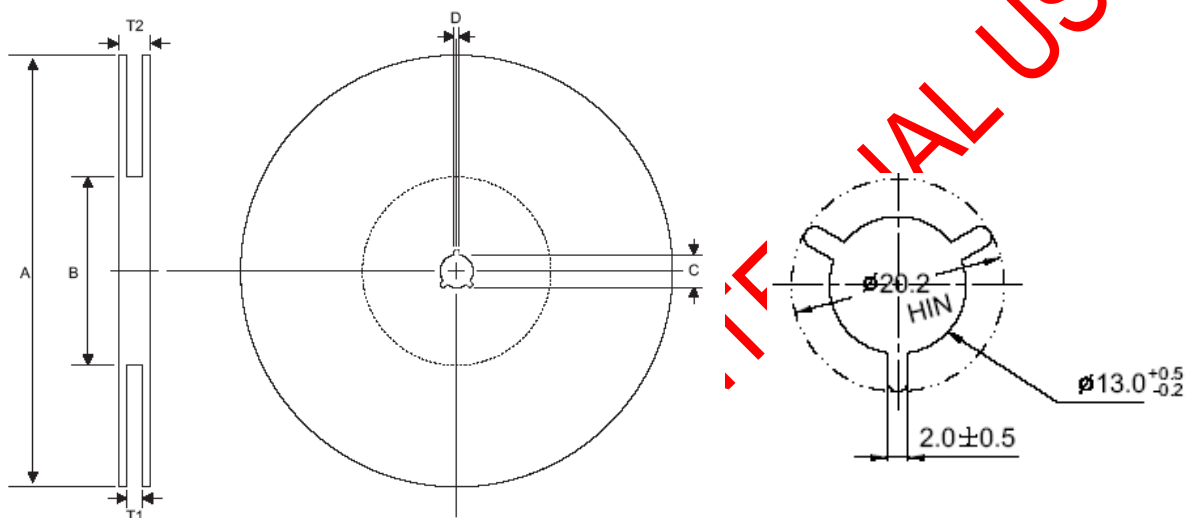


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7.6. Product Tube and Tape & Reel specifications

Package Type	EA/TUBE	TUBE/BOX	EA/BOX	Tapping (EA/Reel)
SOP 16 pin (150MIL)	50	300	15000	2500
SSOP 20 pin (150MIL)	58	300	17400	2500
SOP 24 pin (300MIL)	30	100	3000	1000

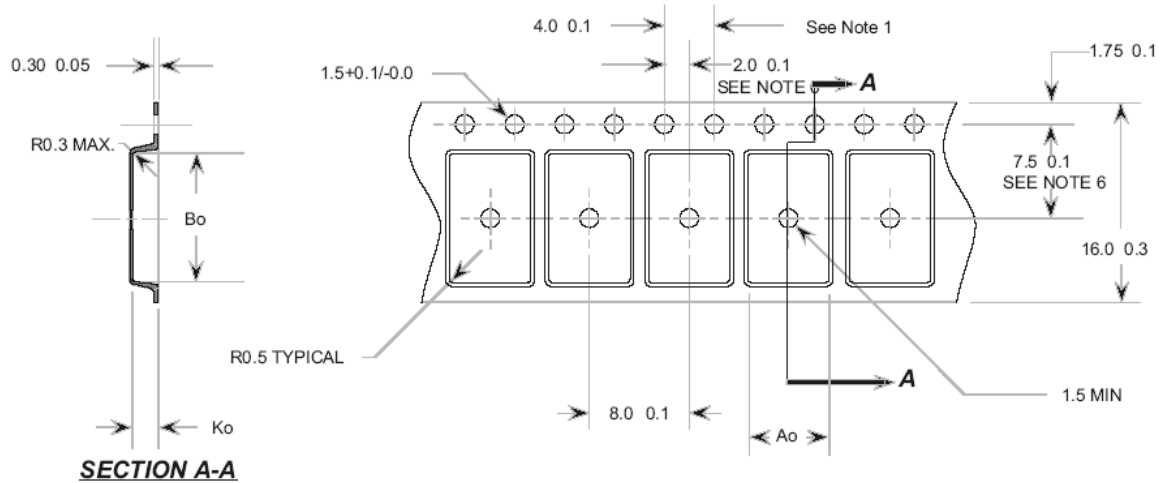
7.6.1. Reel Dimensions



Symbol	Description	Dimensions in mm	
A	Reel Outer Diameter	330	
B	Reel Inner Diameter	100	
C	Spindle Hole Diameter	13 + 0.5 - 0.2	
D	Key Slit Width	2.0 ± 0.5	
T1	Space Between Flange	SOP16L (150MIL)	16.8 + 0.6 - 0.4
		SSOP20L (150MIL)	
		SOP24L (300MIL)	24.8 + 0.6 - 0.4
T2	Reel Thickness	SOP16L (150MIL)	22.2
		SSOP20L (150MIL)	
		SOP24L (300MIL)	30.2



7.6.2. SOP16L Carrier Tape Dimensions

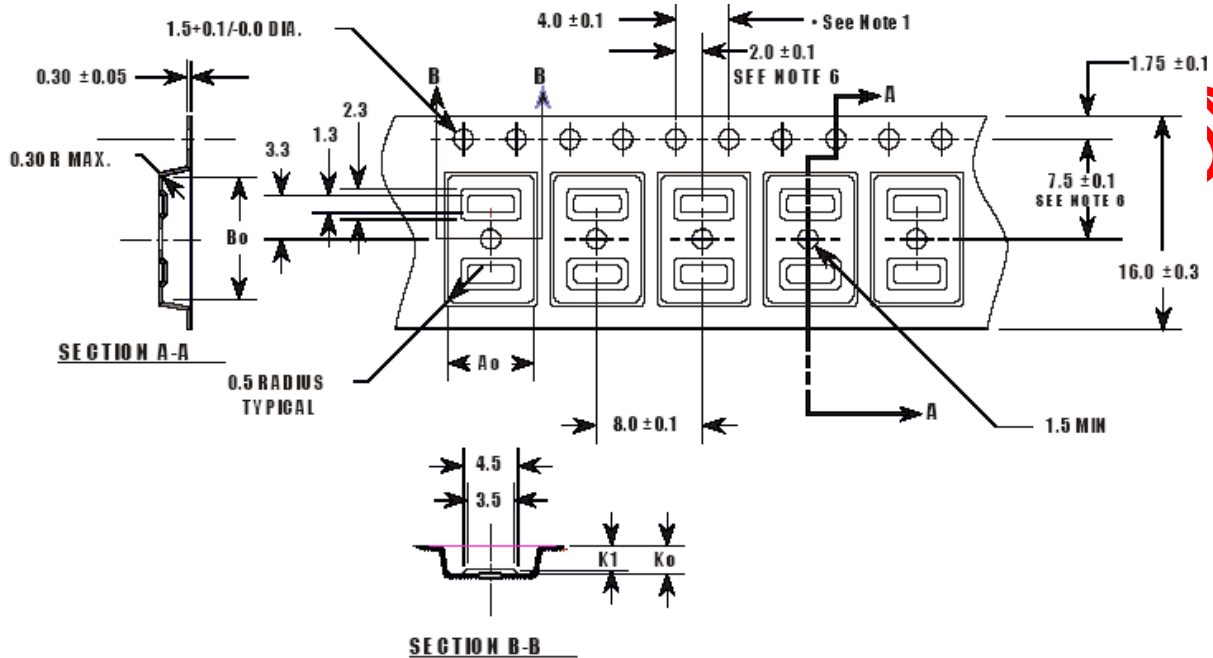


Symbol	Description	Dimensions in mm
Ao	Cavity Length	6.5 ± 0.1
Bo	Cavity width	10.3 ± 0.1
Ko	Cavity Depth	2.1 ± 0.1

Notes:

1. 10 sprocket hole pitch cumulative tolerance ± 0.2
2. Camber not to exceed 1mm in 100mm
3. Material: Conductive Black Polystyrene
4. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

7.6.3. SSOP20L Carrier Tape Dimensions



Symbol	Description	Dimensions in mm
Ao	Cavity Length	6.5±0.1
Bo	Cavity width	9.0±0.1
Ko	Cavity Depth	2.3±0.1
K1	Cavity Depth	1.8±0.1

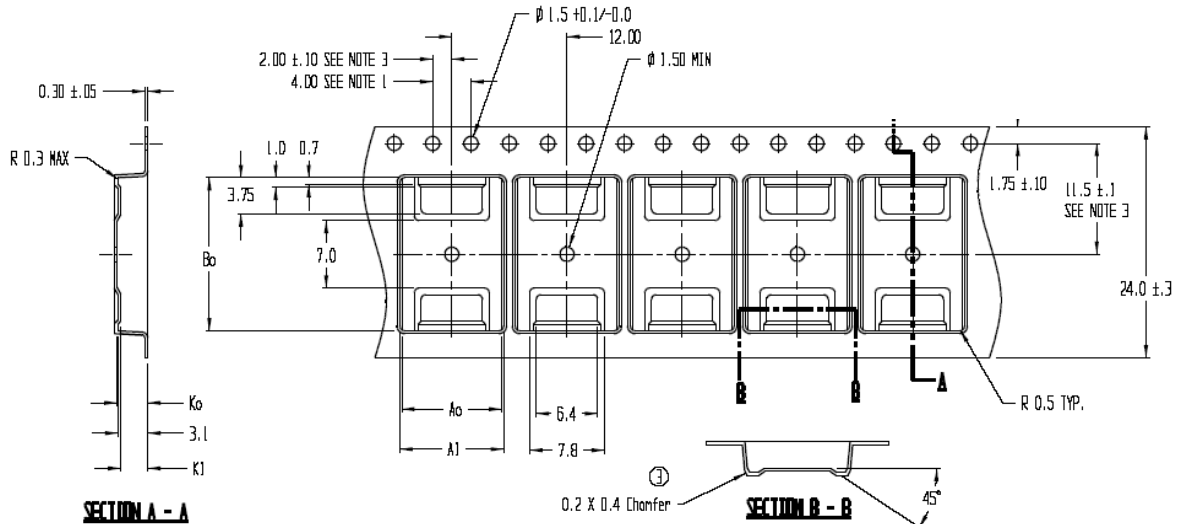
Notes:

1. 10 sprocket hole pitch cumulative tolerance ± 0.2
2. Camber not to exceed 1mm in 100mm
3. Material: Conductive Black Polystyrene
4. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.



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7.6.4. SOP24L Carrier Tape Dimensions



Symbol	Description	Dimensions in mm
Ao	Cavity Length	10.40
A1	Cavity Length	10.80
Bo	Cavity width	15.90
Ko	Cavity Depth	3.20
K1	Cavity Depth	2.80

Notes:

1. 10 sprocket hole pitch cumulative tolerance ± 0.2
2. Camber in compliance with EIA-481
3. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.