

QT-Brightek Optocoupler Series

High CMR, 1 Mbit/s High Speed Optocoupler

Part No.: QT4504

Product: QT4504	Date: February 01 , 2018	Page 1 of 19
	Version# 1.0	

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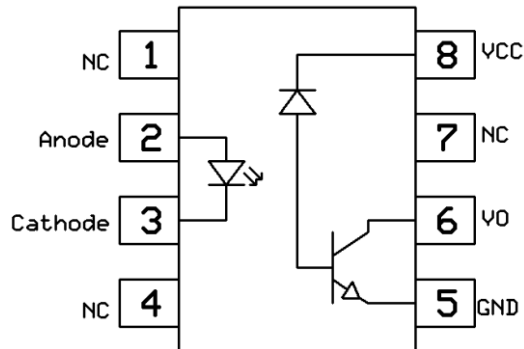
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Introduction

Feature:

- High Speed phototransistor 1Mbit/s
- High Isolation voltage between input and output (Viso = 5000V rms)
- Creepage distance > 7.4mm
- Available in Tube or Tape and reel
- Available with standard DIP-4, Gullwing lead bend, SMD lead bend, and SMD low profile options.

Schematic:



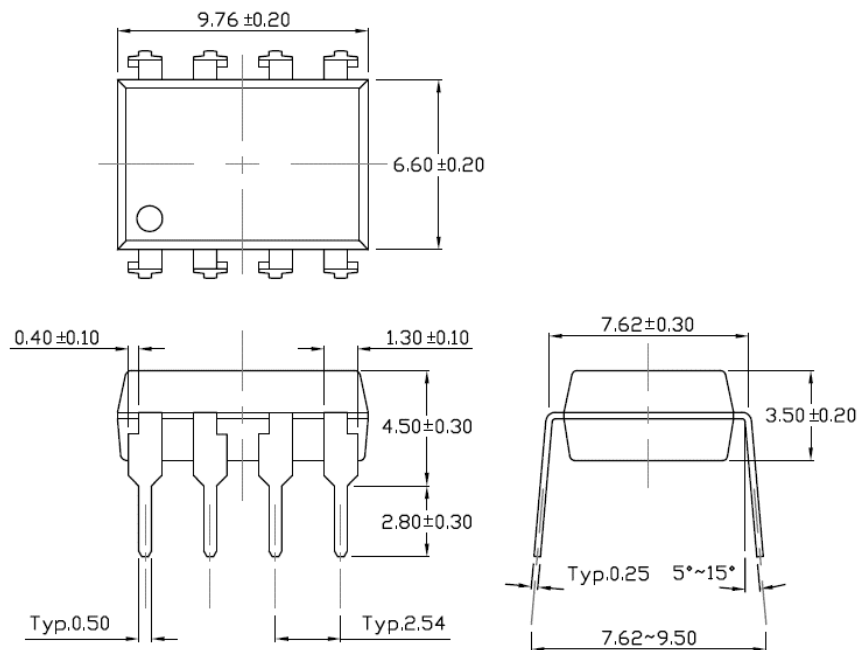
Certification & Compliance:

- Pb free and RoHS Compliant
- UL (Pending Approval)
- VDE (Pending Approval)

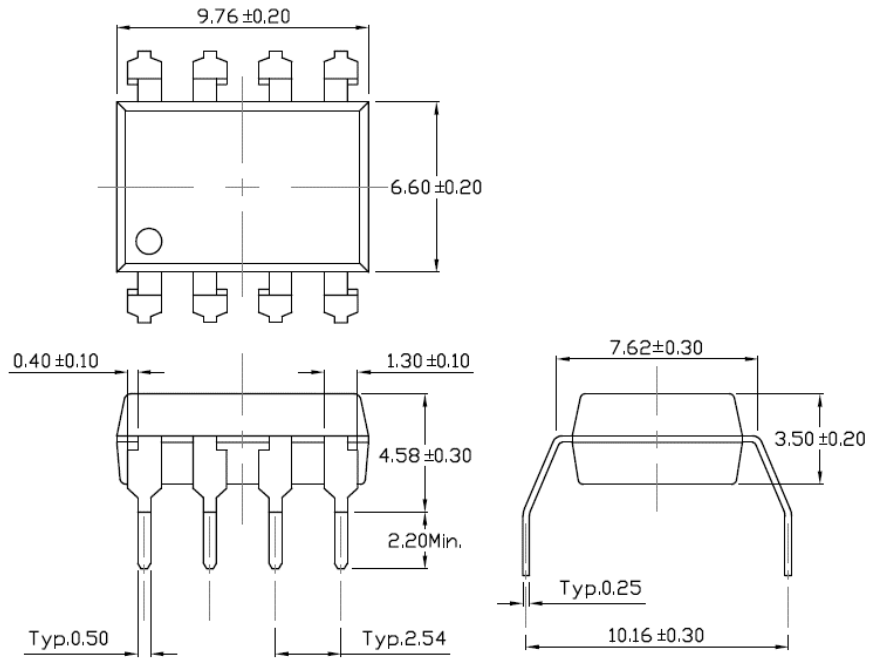


Dimension: (Dot location indicates pin 1)

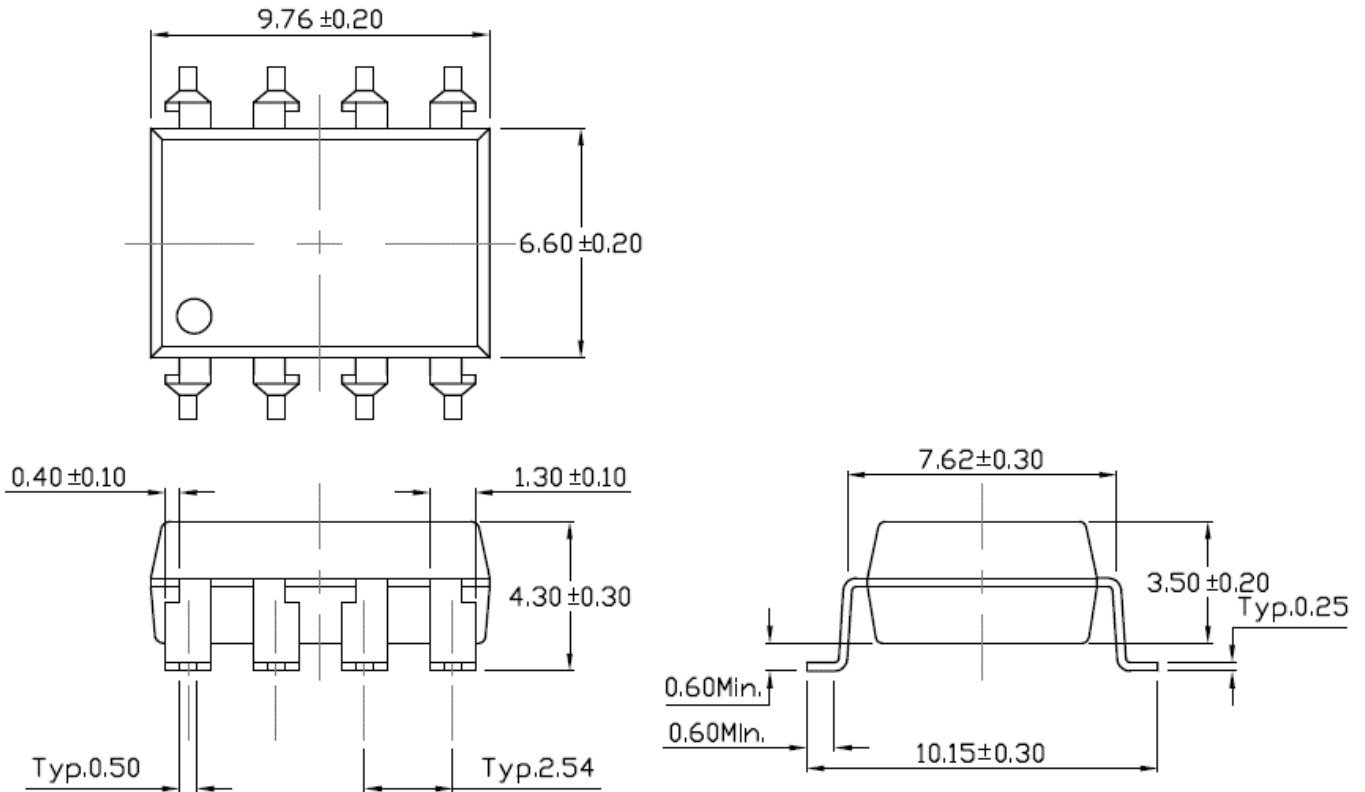
8-Pin Dip (standard):



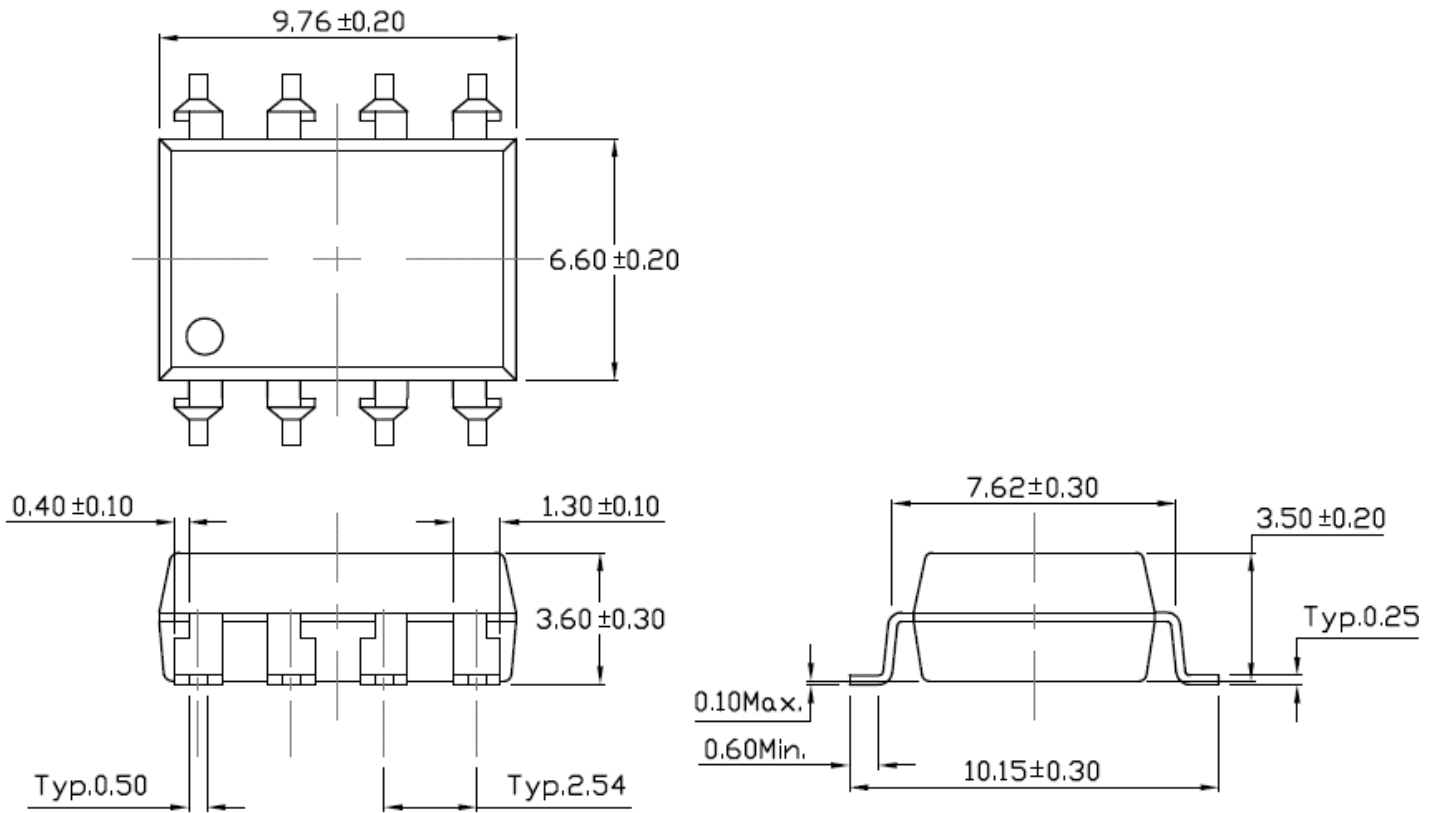
Gullwing (400mil) lead bend (Option M):



SMD lead bend (Option S):



SMD (Low Profile) bend (Option SL):



All Dimensions are in mm

Absolute Maximum Rating

Symbol	Parameter	Rating	Units
V _{ISO}	Isolation Voltage*	5000	V _{RMS}
T _{STG}	Storage Temperature	-55 ~ +125	°C
T _{OPR}	Operating Temperature	-55 ~ +100	°C
T _{SOL}	Lead Solder Temperature	260 for 10 sec	°C

EMITTER

I _F	Forward Current	25	mA
I _{FP}	Peak Forward Current (50% duty, 1ms P.W)	50	mA
I _{F(TRANS)}	Peak transient Current (≤ 1us, 300pps)	1	A
V _R	Reverse Voltage	5	V
P _D	Power Dissipation	45	mW
	Power Dissipation Derated above 100°C	-	mW/°C

DETECTOR

P _D	Power Dissipation	100	mW
V _{EBR}	Emitter-Base reverse voltage	5	V
I _B	Base current	5	mA
I _{O(AVG)}	Average Output current	8	mA
I _{O(PEAK)}	Peak Output current	16	mA
V _O	Output voltage	-0.5 to 20	V
V _{CC}	Supply voltage	-0.5 to 30	V

*AC for 1 minute, RH =40~60%

Electrical Characteristic (T_A=25 °C)

(T_A=0 to 70C unless specified otherwise)

Emitter

Symbol	Characteristics	Test Condition	Range			Unit
			Min	Typ	Max	
V _F	Forward Voltage	I _F = 16mA	-	1.45	1.6	V
V _R	Reverse Voltage	I _R = 10μA	5	-	-	V
ΔV _F /ΔT _A	Temperature coefficient of forward voltage	I _F = 16mA	-	-1.8	-	mV/°C

Detector

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
I _{OH}	Logic High Output Current	I _F =0mA, V _O =V _{CC} =5.5V, T _A =25°C	-	0.001	0.5	μA
		I _F =0mA, V _O =V _{CC} =15V, T _A =25°C	-	0.01	1	
		I _F =0mA, V _O =V _{CC} =15V	-	-	50	
I _{CCL}	Logic Low Supply Current	I _F =16mA, V _O =Open, V _{CC} =15V	-	140	200	μA
I _{CCH}	Logic High Supply Current	I _F =0mA, V _O =Open, V _{CC} =15V, T _A =25°C	-	0.01	1	μA
		I _F =0mA, V _O =Open, V _{CC} =15V	-	-	2	

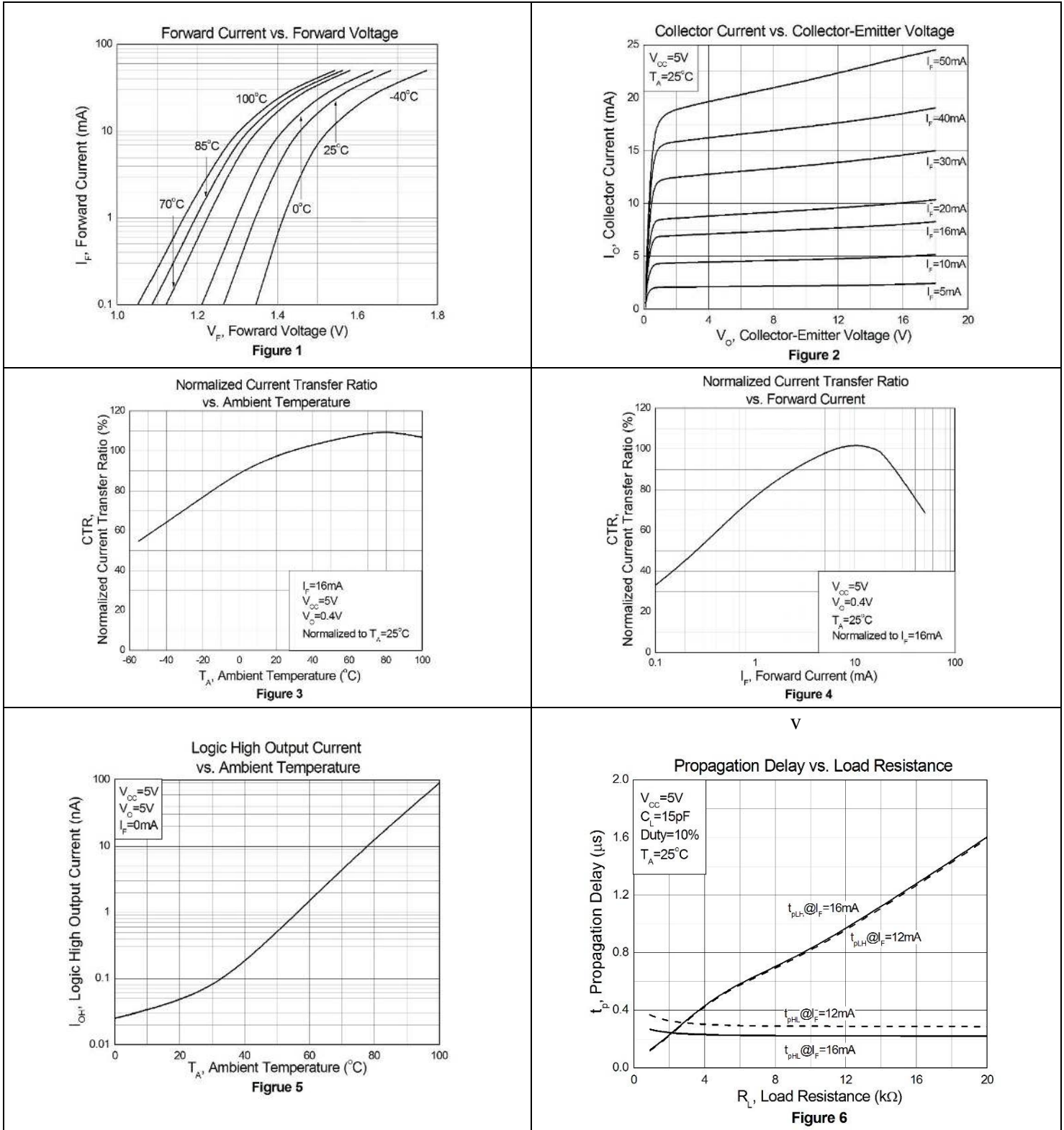
Transfer Characteristics

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
CTR	Current Transfer Ratio	$I_F=16\text{mA}, V_O=0.4\text{V}, V_{CC}=4.5\text{V}, T_A=25^\circ\text{C}$	25	35	60	%
		$I_F=16\text{mA}, V_O=0.5\text{V}, V_{CC}=4.5\text{V}$	21	40	-	
		$I_F=12\text{mA}, V_O=0.4\text{V}, V_{CC}=4.5\text{V}, T_A=25^\circ\text{C}$	26	38	65	
		$I_F=12\text{mA}, V_O=0.5\text{V}, V_{CC}=4.5\text{V}$	22	43	-	
V_{OL}	Logic Low Output Voltage	$I_F=16\text{mA}, I_O=4.0\text{mA}, V_{CC}=4.5\text{V}, T_A=25^\circ\text{C}$	-	0.2	0.4	V
		$I_F=16\text{mA}, I_O=3.3\text{mA}, V_{CC}=4.5\text{V}$	-	-	0.5	

Switching Characteristics (TA=25°C, VCC=5V)

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
T _{PHL}	Propagation Delay Time Logic High to Logic Low	I _F =16mA, V _{CC} =5.0V, R _L =1.9kΩ, C _L =15pF, V _{THHL} =1.5V, T _A =25°C	-	0.24	0.3	μs
		I _F =16mA, V _{CC} =5.0V, R _L =1.9kΩ, C _L =15pF, V _{THHL} =1.5V.	-	-	0.5	
		I _F =12mA, V _{CC} =15.0V, R _L =20kΩ, C _L =100pF, V _{THHL} =1.5V, T _A =25°C	-	0.58	0.7	
		I _F =12mA, V _{CC} =15.0V, R _L =20kΩ, C _L =100pF, V _{THHL} =1.5V	-	-	1.0	
T _{PLH}	Propagation Delay Time Logic Low to Logic High	I _F =16mA, V _{CC} =5.0V, R _L =1.9kΩ, C _L =15pF, V _{THLH} =1.5V, T _A =25°C	-	0.21	0.5	μs
		I _F =16mA, V _{CC} =5.0V, R _L =1.9kΩ, C _L =15pF, V _{THLH} =1.5V.	-	0.21	0.7	
		I _F =12mA, V _{CC} =15.0V, R _L =20kΩ, C _L =100pF, V _{THLH} =2.0V, T _A =25°C	-	0.76	1.1	
		I _F =12mA, V _{CC} =15.0V, R _L =20kΩ, C _L =100pF, V _{THLH} =2.0V	-	0.76	1.4	
T _{PLH} - T _{PHL}	Propagation Delay Difference	I _F =12mA, V _{CC} =15.0V, R _L =20kΩ, C _L =100pF, V _{THHL} =1.5V, V _{THLH} =2.0V, T _A =25°C	-0.4	0.3	0.9	μs
		I _F =12mA, V _{CC} =15.0V, R _L =20kΩ, C _L =100pF	-0.7	0.3	1.3	
CM _H	Common Mode Transient Immunity at Logic High	I _F = 0mA, V _{CM} =1.5kVp-p, V _{CC} =5V, R _L =1.9kΩ, C _L =15pF, T _A =25°C	15000	30000	-	V/μs
		I _F = 0mA, V _{CM} =1.5kVp-p, V _{CC} =15V, R _L =20kΩ, C _L =100pF, T _A =25°C	15000	30000	-	
CM _L	Common Mode Transient Immunity at Logic Low	I _F = 12mA, V _{CM} =1.5kVp-p, V _{CC} =5V, R _L =1.9kΩ, C _L =15pF, T _A =25°C	15000	30000	-	
		I _F = 16mA, V _{CM} =1.5kVp-p, V _{CC} =15V, R _L =20kΩ, C _L =100pF, T _A =25°C	15000	30000	-	

Characteristic Curves



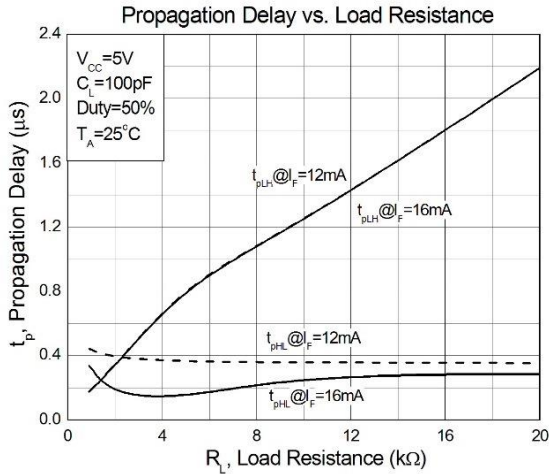


Figure 7

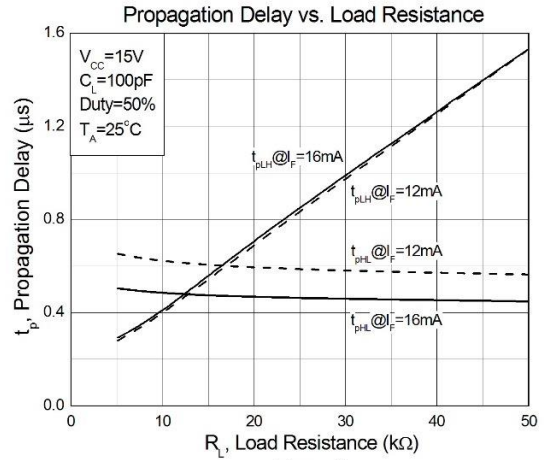


Figure 8

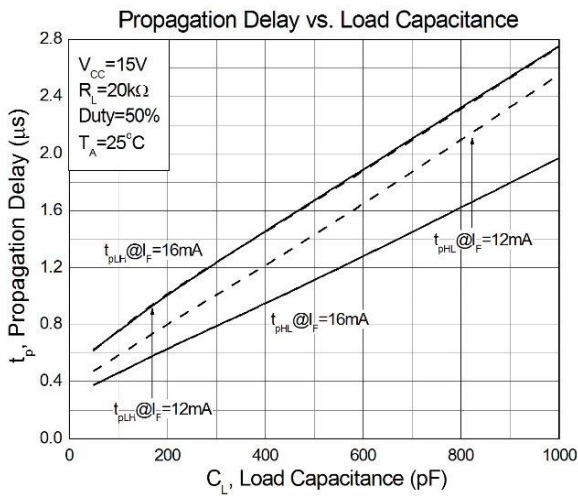


Figure 9

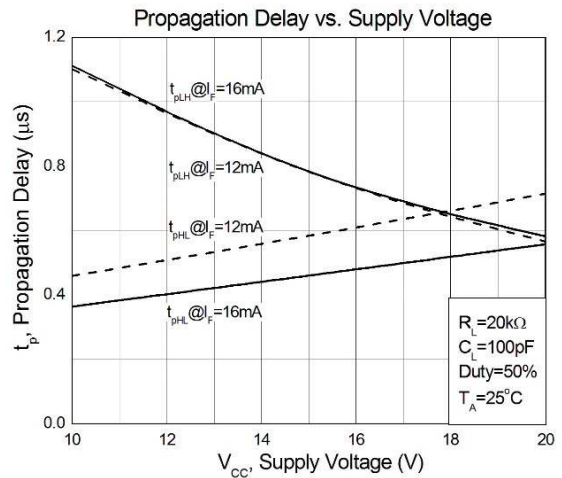


Figure 10

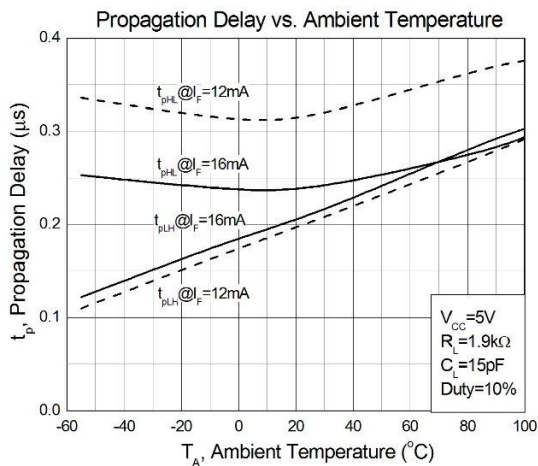


Figure 11

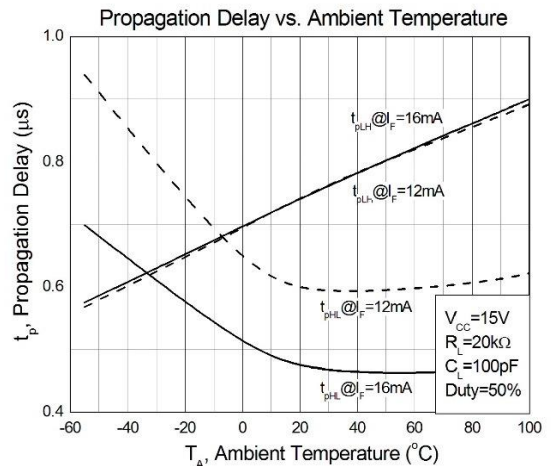
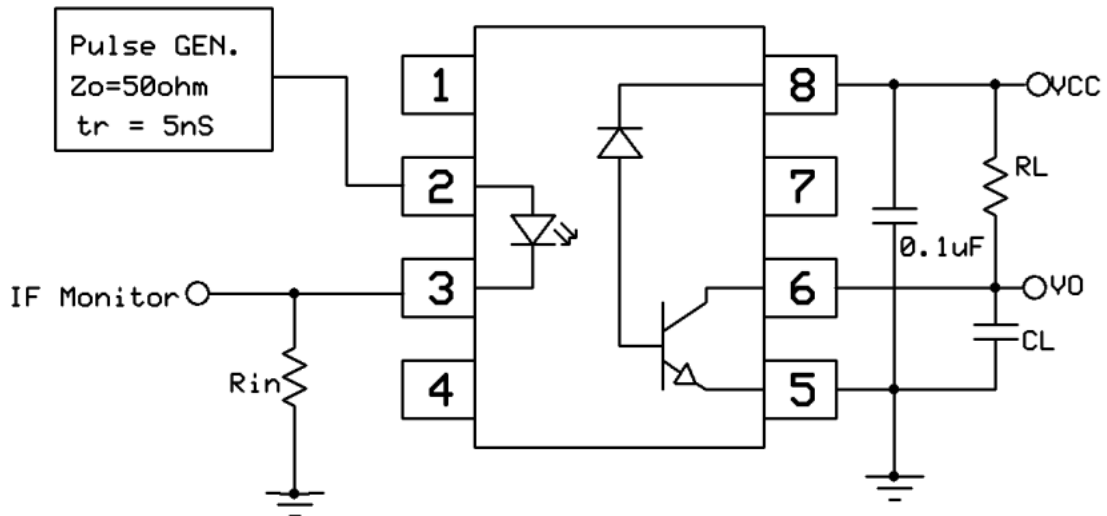
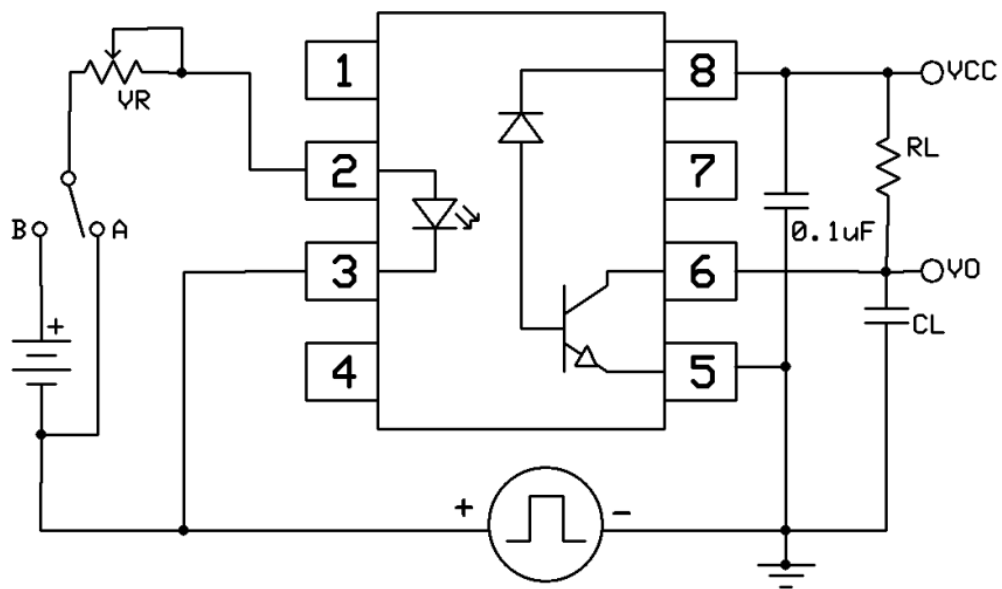


Figure 12

Test Circuits



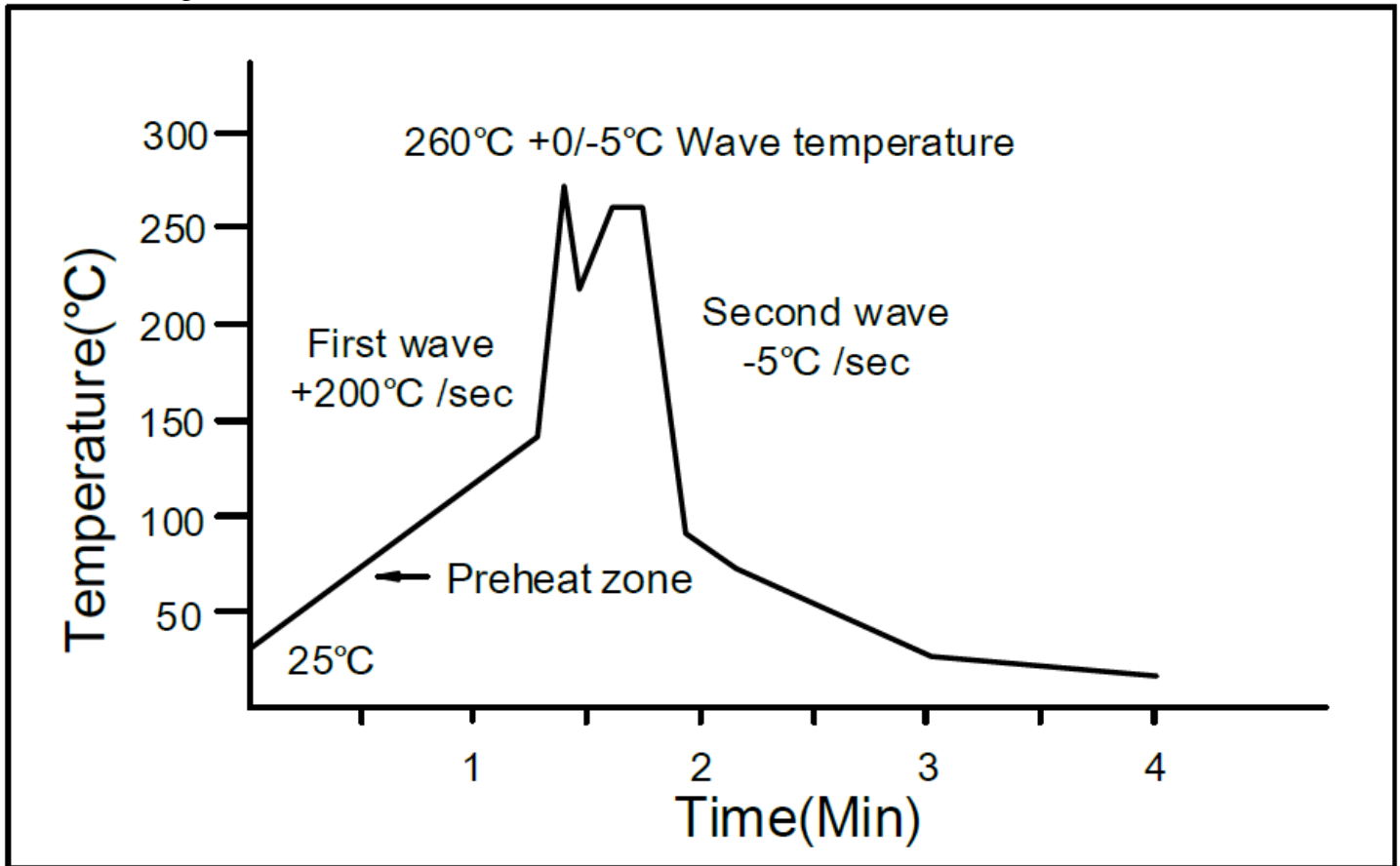
Switching Time Test Circuit



CMR Test Circuit

Solder Profile & Footprint

Wave soldering



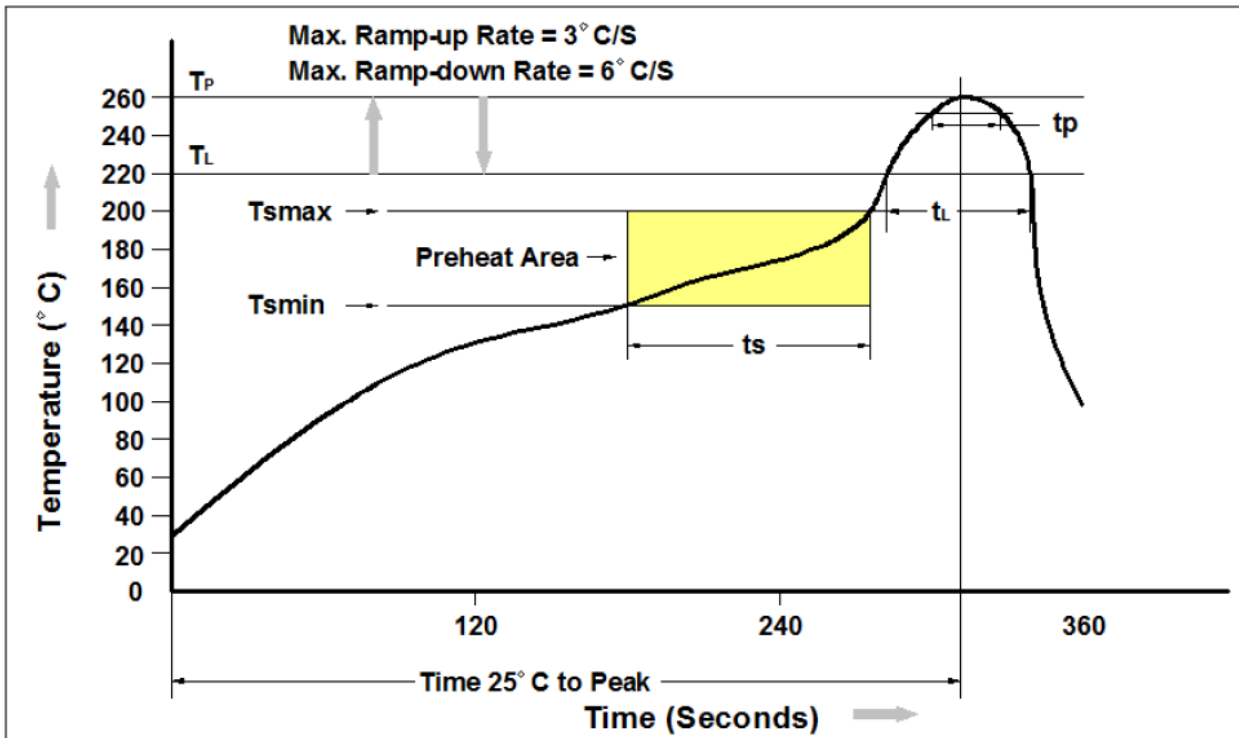
Temperature: 260 +0/-5 °C

Time: 10 Sec

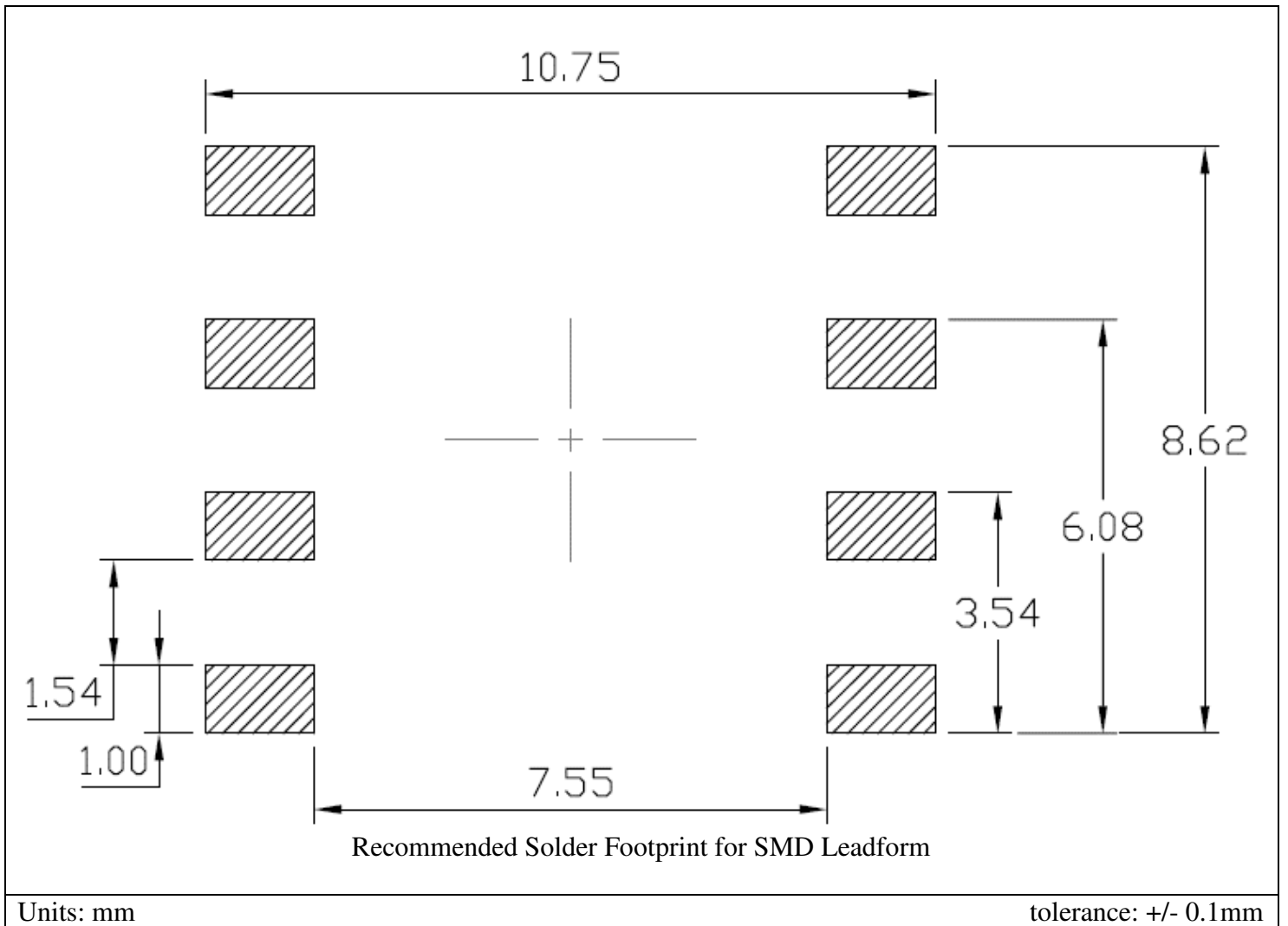
Preheat temperature: 25 to 140 °C

Preheat time: 30 to 80 sec.

Reflow Soldering



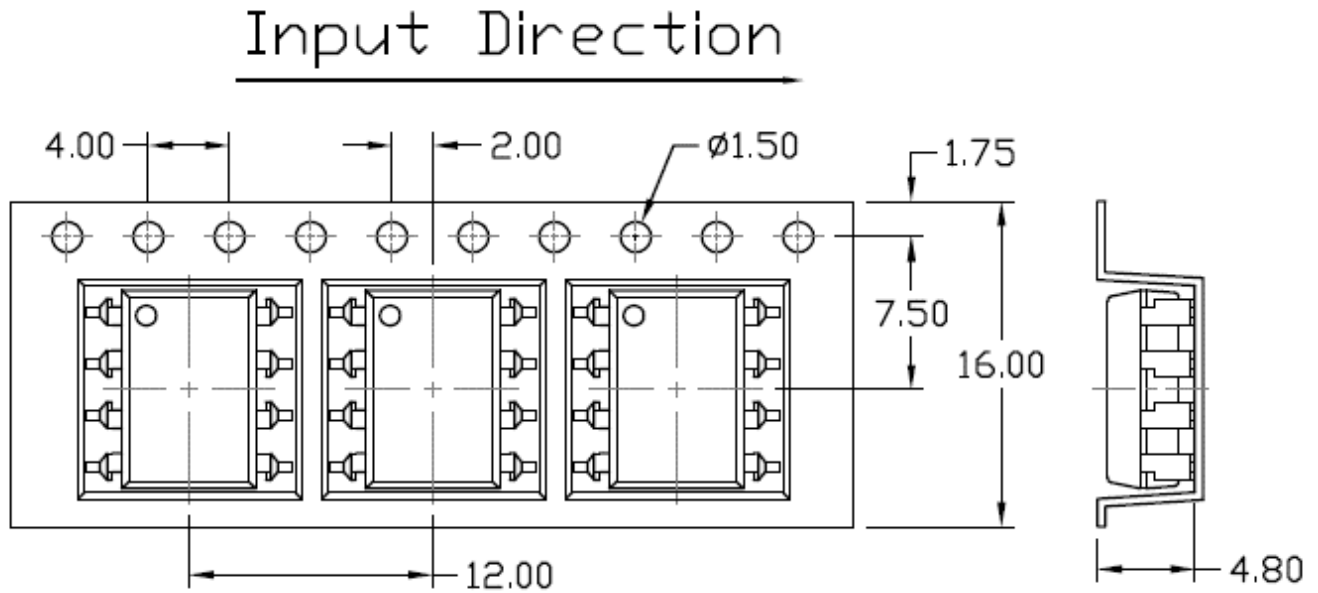
Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{smin})	150°C
Temperature Max. (T _{smax})	200°C
Time (t _s) from (T _{smin} to T _{smax})	60-120 seconds
Ramp-up Rate (t _L to t _P)	3°C/second max.
Liquidous Temperature (T _L)	217°C
Time (t _L) Maintained Above (T _L)	60 – 150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time (t _P) within 5°C of 260°C	30 seconds
Ramp-down Rate (T _P to T _L)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.



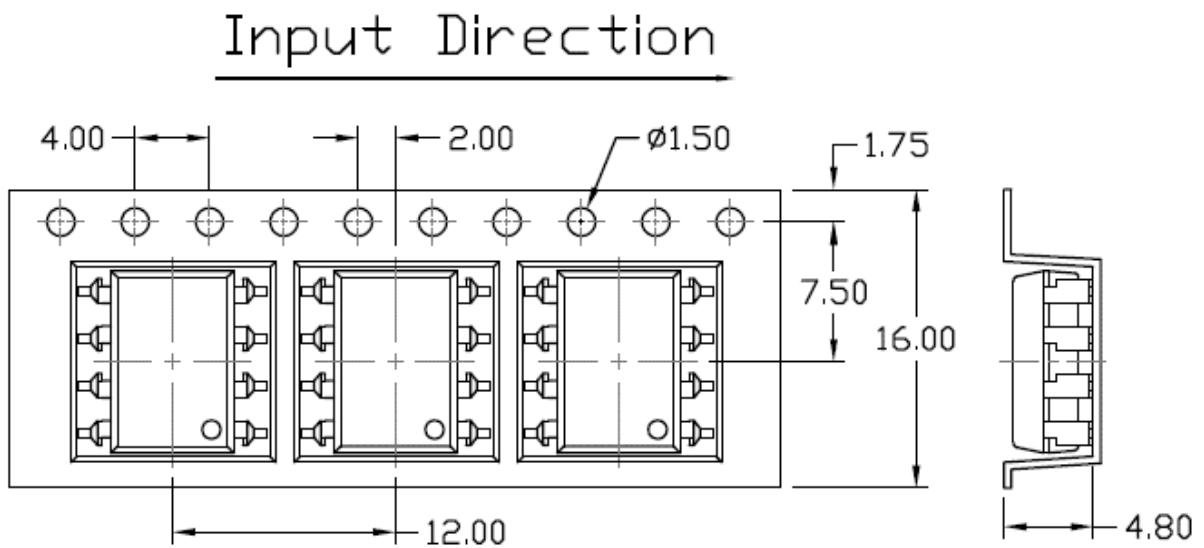
Packing & Labeling

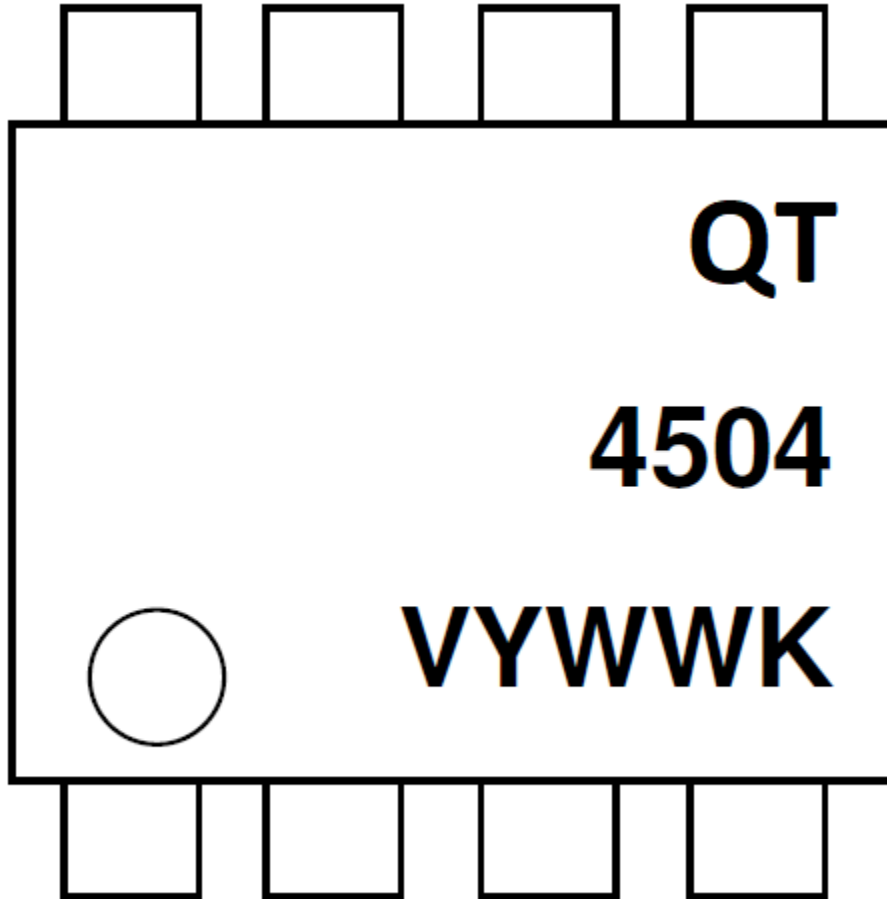
Tape Dimension:

Option S(T1) & SL(T1)



Option S(T2) & SL(T2)



Device Marking

QT = QT-Brightek Corporation
4504 = part number
Y = Year
WW = Week
V = VDE Option
K = Manufacturing code

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Ordering Information

QT4504(V)(Y)(Z)

V = VDE option (V or None)

Y = Lead form option (S, SL, M or none)

Z=Tape and reel option (T1 or T2)

Option	Description	Quantity
None	Standard 8-Pin DIP	40 Units/Tube
M	Gullwing	40 Units/Tube
S(T1)	Surface Mount Lead Forming – with Option 1 Taping	1000 pcs/ reel
S(T2)	Surface Mount Lead Forming – with Option 2 Taping	1000 pcs/ reel
SL(T1)	SMD (Low Profile) Lead Forming – with Option 1 Taping	1000 pcs/ reel
SL(T2)	SMD (Low Profile) Lead Forming – with Option 2 Taping	1000 pcs/ reel

Revision History

Description:	Revision #	Revision Date
Initial release of QT4504	1.0	02/01/2018

Disclaimer

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.