



0.6A MOSFET/IGBT Gate Driver Optocoupler

Features

- Peak Output Current : $I_{OP} = \pm 0.6A$ (max)
- Threshold Input Current: $I_{FLH} = 5$ mA (max)
- Common mode transient immunity : $\pm 10kV/\mu s$ (min)
- Pb free and RoHS compliant.
- Regulatory Approvals
 - UL - UL1577 (E364000)
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC – GB4943.1, GB8898
 - IEC60065, IEC60950

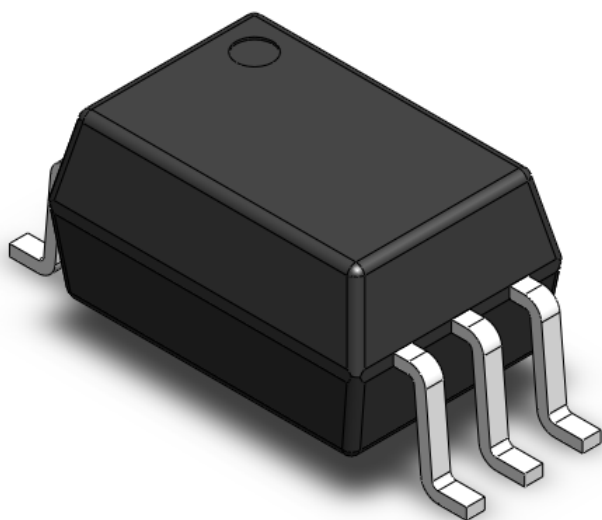
Applications

- Isolated IGBT/Power MOSFET gate drive
- Industrial Inverter
- AC brushless and DC motor drives
- Induction Heating

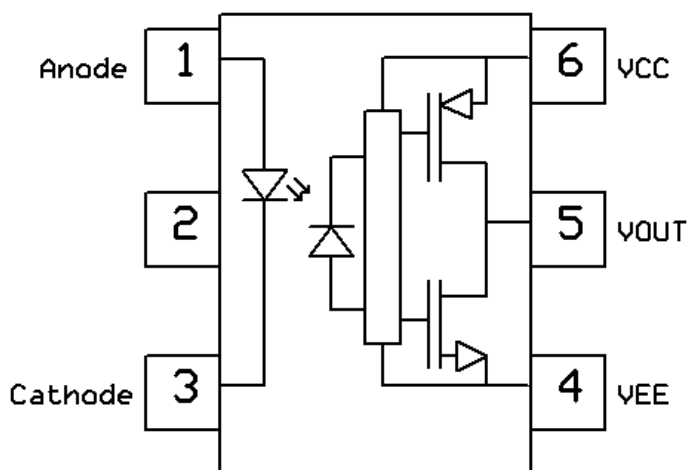
Description

The CTS701 consists of a GaAsP LED optically coupled to an integrated circuit with a power output stage. This optocoupler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications. The high operating voltage range of the output stage provides the drive voltages required by gate controlled devices.

Package Outline



Schematic





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Truth Table

LED	V _{CC} -V _{EE} Positive Going	V _{CC} -V _{EE} Negative Going	Output
Off	0 to 30 V	0 to 30V	Low
On	0 to 6.5V	0 to 6V	Low
On	6.5 to 8.3V	6 to 8V	Transition
On	8.3 to 30V	8 to 30V	High

Absolute Maximum Rating at 25°C

Symbol	Parameters	Ratings	Units	Notes
V _{ISO}	Isolation voltage	5000	V _{RMS}	1
T _{OPR}	Operating temperature	-40 ~ +100	°C	
T _{STG}	Storage temperature	-55 ~ +125	°C	
T _{SOL}	Soldering temperature	260	°C	2
f _{OPR}	Operating Frequency	25	kHz	3
Emitter				
I _F	Forward current	25	mA	
I _{FP}	Peak forward current (P _W ≤1μs, 300pps)	1	A	
V _R	Reverse voltage	5	V	
P _D	Input Power Dissipation	40	mW	
Detector				
P _C	Power dissipation	160	mW	
V _{O(PEAK)}	Peak Output Voltage	35	V	
V _{CC}	Supply Voltage	35	V	
I _{OPH}	Output High Peak Current	-0.6	A	4
I _{OPL}	Output Low Peak Current	0.6	A	4

Notes

1. AC for 1 minute, RH = 40 ~ 60%.
2. For 10 second peak
3. Exponential Waveform, I_{O(PEAK)} ≤ |0.3A|, Pulse Width ≤ 2us
4. Pulse Width ≤ 2uS, f ≤ 15kHz



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Recommended Operating Conditions

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Input Current	$I_{F(ON)}$	7.5		10	Ma
Input Voltage	$V_{F(OFF)}$	0		0.8	V
Supply Voltage	V_{CC}	10		30	V
Peak Output Current	I_{OPH}/I_{OPL}			± 0.2	A
Operating Temperature	T_{opr}	-40		100	$^{\circ}C$

Electrical Characteristics

Typical values are measured at $V_{CC}=30V$, $V_{EE}=Gnd$, $T_A = -40^{\circ}C$ to $100^{\circ}C$ (unless otherwise specified)

Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Typ*	Max	Units	Notes
V_F	Forward Voltage	$I_F = 5mA$	-	1.4	1.7	V	
V_R	Reverse Voltage	$I_R = 10\mu A$	5.0	-	-	V	
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage	$I_F = 5mA$	-	-1.7	-	mV/ $^{\circ}C$	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ*	Max	Units	Notes
I_{CCL}	Logic Low Supply Current	$V_F = 0$ to $0.8V$, $V_O = Open$	-	1.95	3	mA	
I_{CCH}	Logic High Supply Current	$I_F = 7mA$ to $10mA$, $V_O = Open$	-	1.98	3		

Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ*	Max	Units	Notes
V_{OH}	High Level Output Voltage	$I_F = 5mA$, $I_O = -100mA$	6.0	9.7	-	V	
V_{OL}	Low Level Output Voltage	$V_{CC} = 10V$, $I_O = 100mA$	-	0.28	1.0		
I_{OPH}	High Level Output Current	$V_{CC} = 15V$, $V_{6-5} = 4V$, $I_F = 5mA$	-	-1.1	-0.2	A	
		$V_{CC} = 15V$, $V_{6-5} = 10V$, $I_F = 5mA$		-1.8	-0.4		
I_{OPL}	Low Level Output Current	$V_{CC} = 15V$, $V_{6-5} = 2V$, $I_F = 0mA$	0.2	0.66	-	A	
		$V_{CC} = 15V$, $V_{6-5} = 10V$, $I_F = 0mA$	0.4	1.34	-		
I_{FLH}	Input Threshold Current	$V_O > 1V$, $V_{CC} = 15V$	-	3.8	5	mA	
V_{FHL}	Input Threshold Voltage	$V_O < 1V$, $V_{CC} = 15V$	0.8	-	-	V	

(*): All typical value are at $T_a = 25^{\circ}C$

**0.6A MOSFET/IGBT Gate Driver Optocoupler****Electrical Characteristics**

Typical values are measured at $V_{CC}=30V$, $V_{EE}=Gnd$, $T_A = -40^{\circ}C$ to $100^{\circ}C$ (unless otherwise specified)

Switching Characteristics

Symbol	Parameters	Test Conditions		Min	Typ	Max	Units	Notes
T_{PHL}	High to Low Propagation Delay	$I_F = 7$ to $16mA$, $C_L = 3nF$, $R_L = 47\Omega$		-	110	200	ns	
T_{PLH}	Low to High Propagation Delay			-	120	200	ns	
P_{WD}	Pulse Width Distortion			-	-	45	ns	
t_{PSK}	Propagation Delay Skew			-	-	38	ns	
t_r	Rise Time			-	30	100	ns	
t_f	Fall Time			-	15	60	ns	
$ CM_H $	Common Mode Transient High	$V_{CC} = 30V$, $T_A = 25^{\circ}C$,	$I_F = 7$ to $16mA$ $V_{O(min)} = 26V$	-10	-	-	$kV/\mu s$	
$ CM_L $	Common Mode Transient Low	$V_{CM} = 1kV$	$I_F = 0mA$ $V_{O(max)} = 1V$	10	-	-	$kV/\mu s$	

(*): All typical value are at $T_a = 25^{\circ}c$



Typical Performance Curve

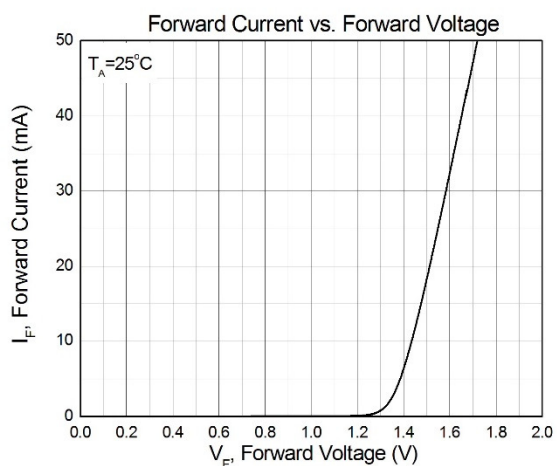


Figure 1

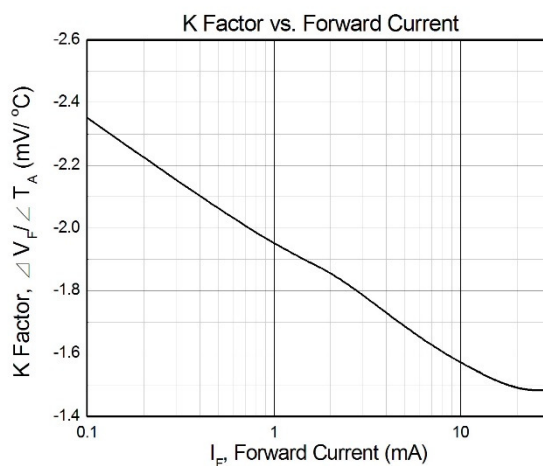


Figure 2

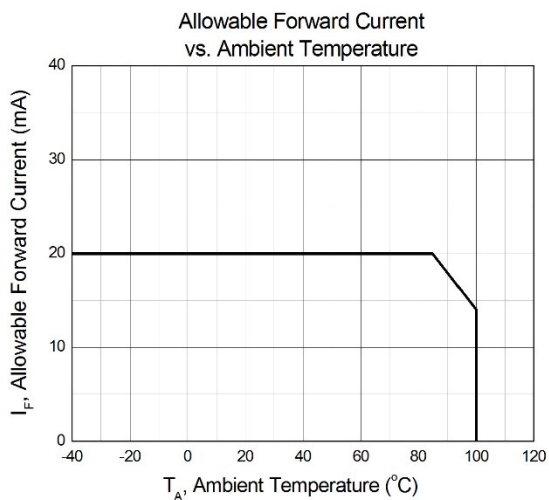


Figure 3

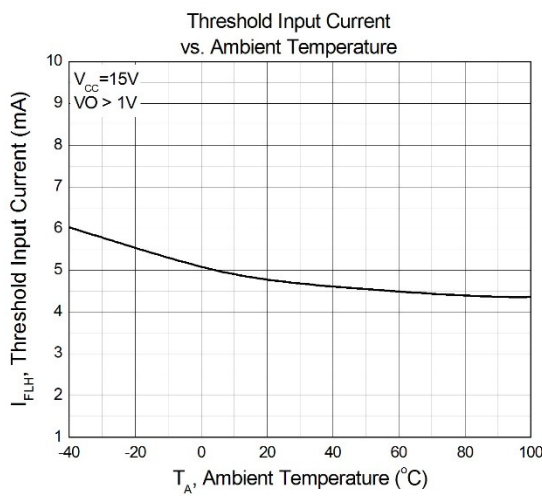


Figure 4

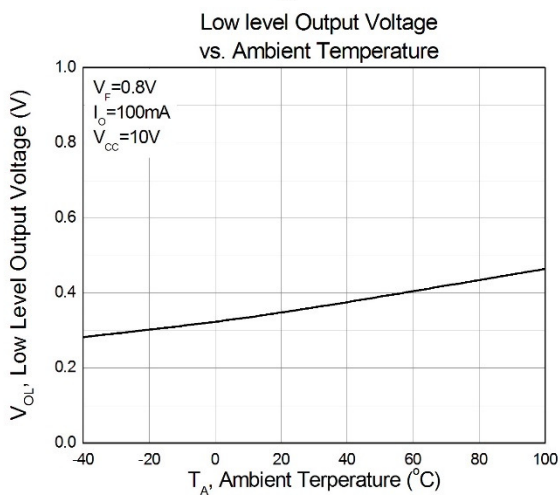


Figure 5

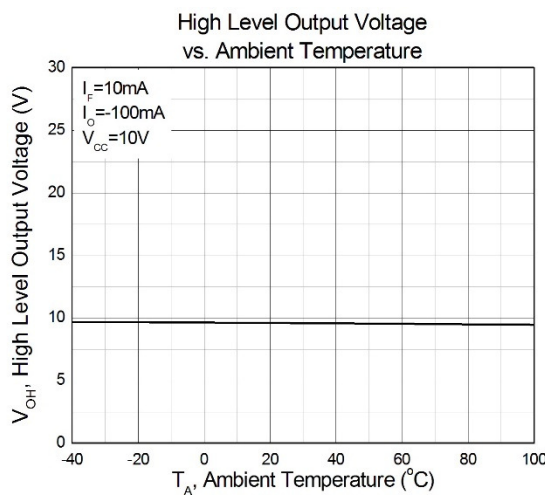


Figure 6



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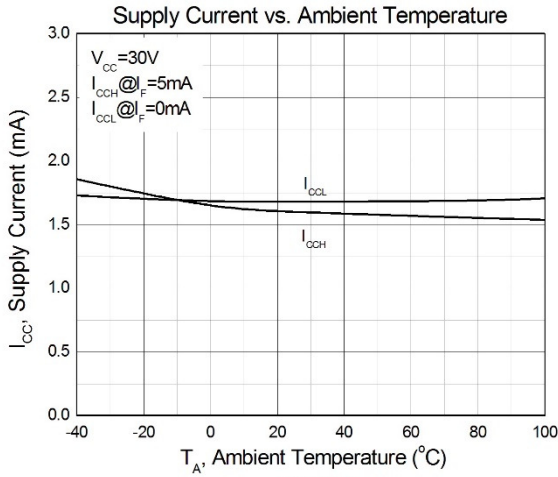


Figure 7

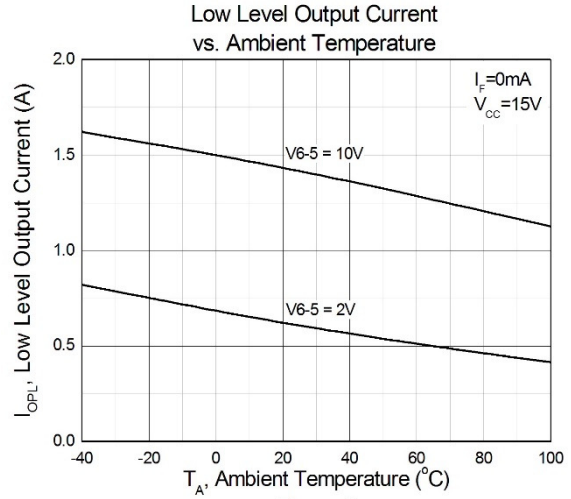


Figure 8

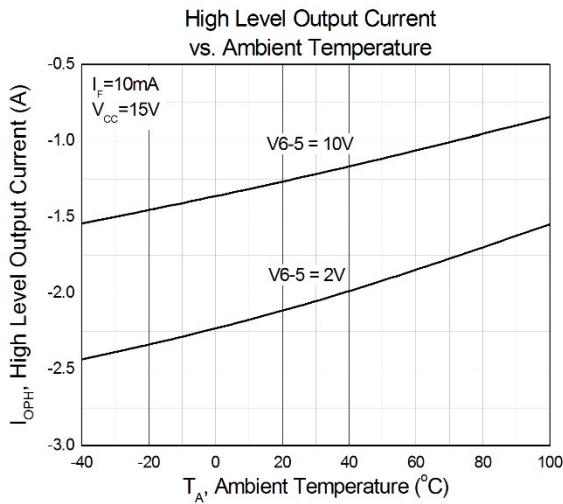


Figure 9

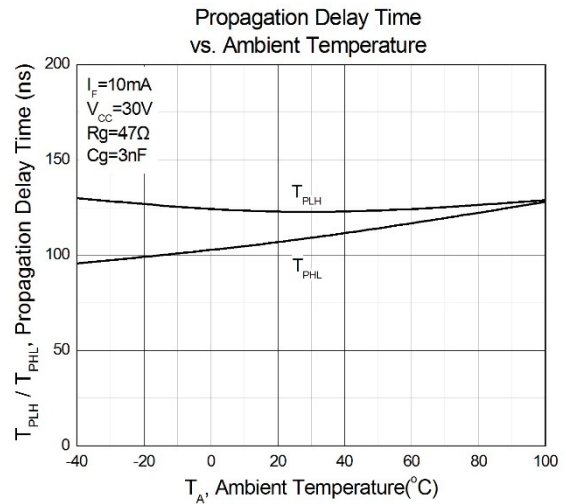


Figure 10



0.6A MOSFET/IGBT Gate Driver Optocoupler

Test Circuits

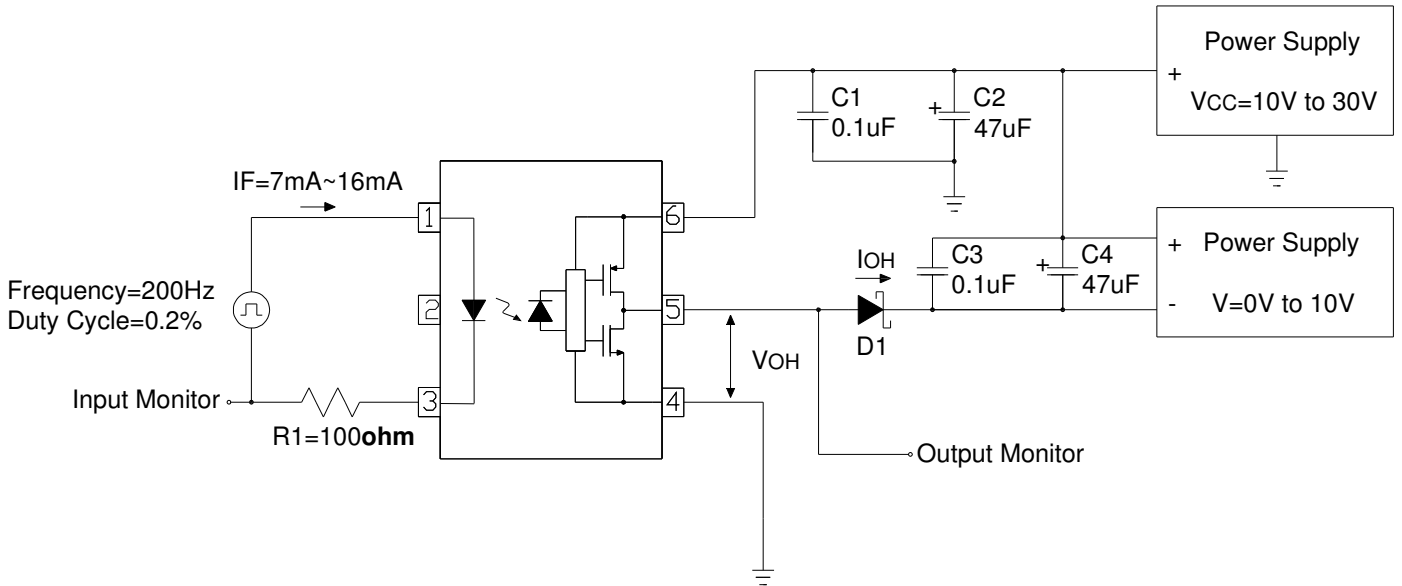


Fig. 11 Test Circuit : IO_{PH}

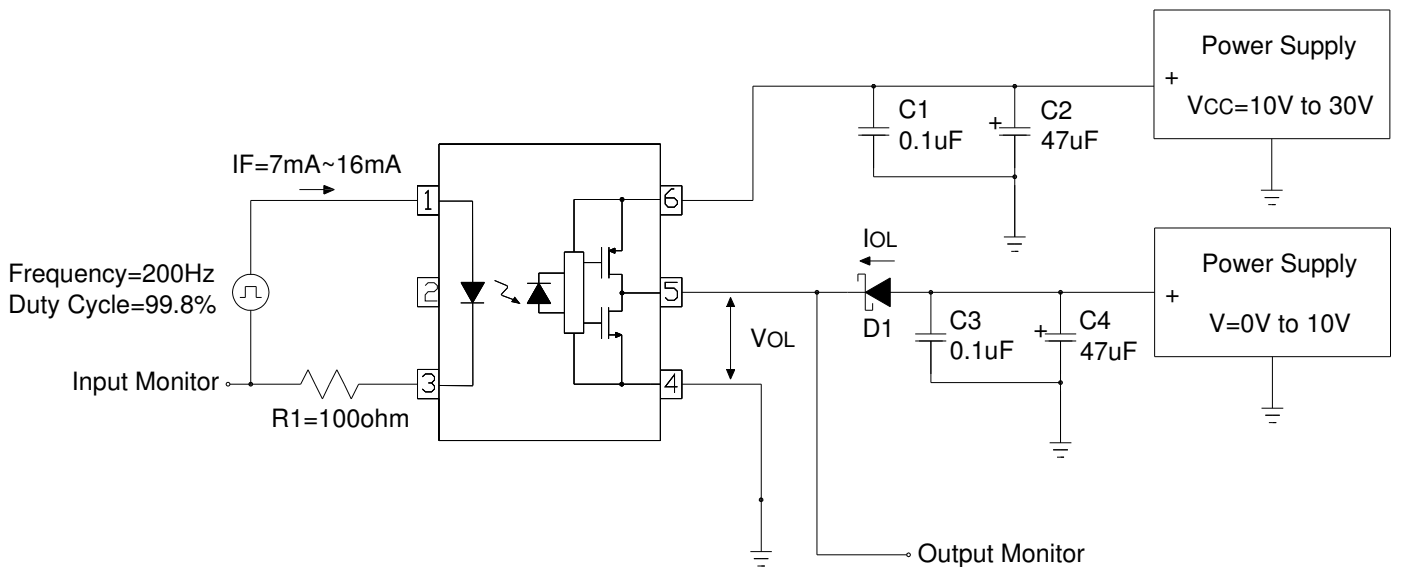


Fig. 12 Test circuit : IO_{PL}



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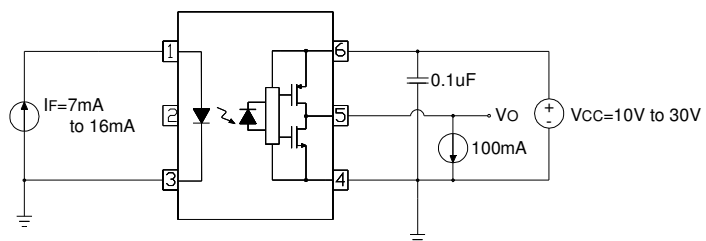


Fig. 13 Test circuit : V_{OH}

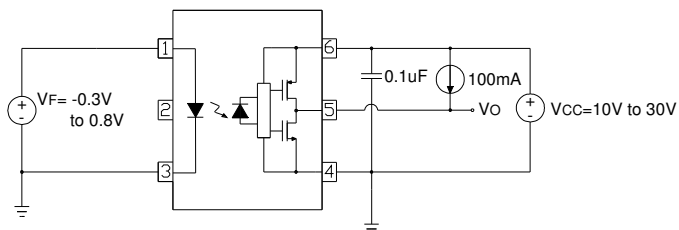


Fig. 14 Test circuit : V_{OL}

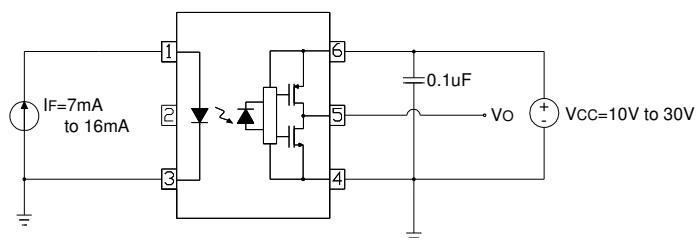


Fig. 15 Test circuit : I_{CCH}

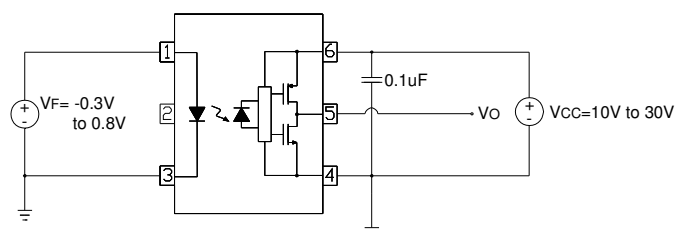


Fig. 16 Test circuit : I_{CCL}

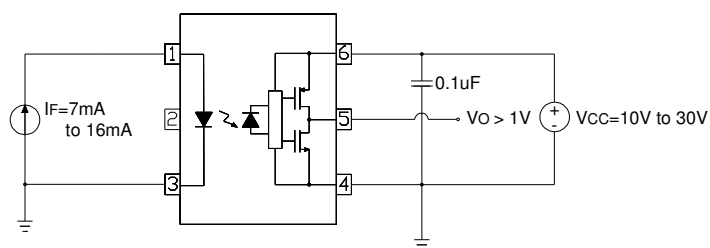


Fig. 17 Test circuit: I_{FLH}

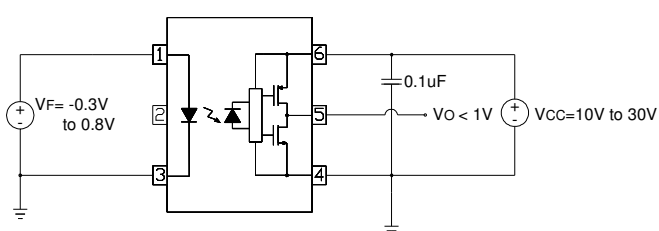


Fig. 18 Test circuit: V_{FHL}



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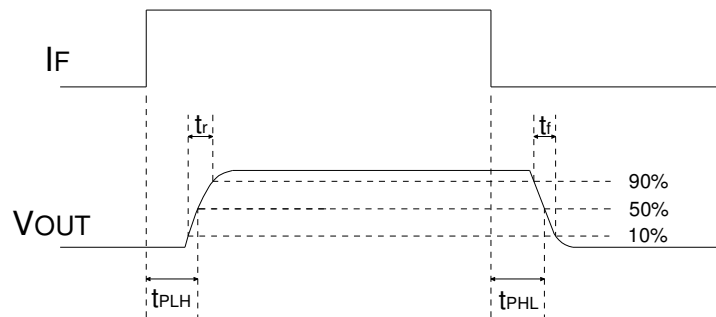
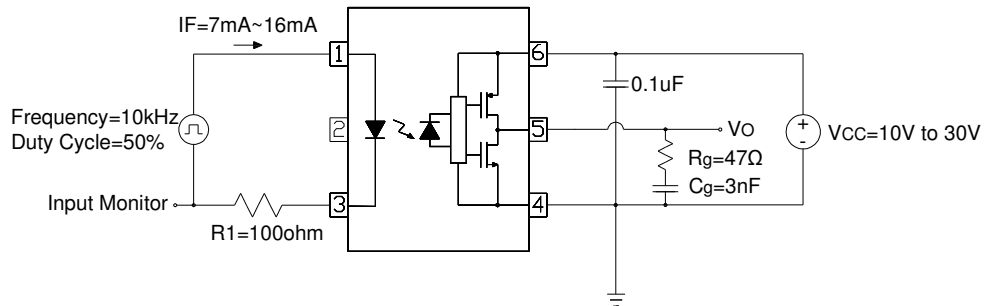


Fig. 19 Test circuit and waveforms for t_{PHL} , t_{PLH} , t_r , and t_f

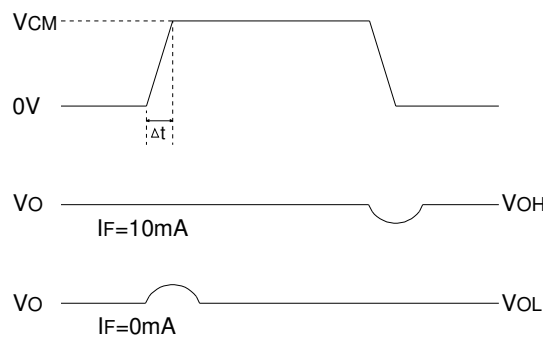
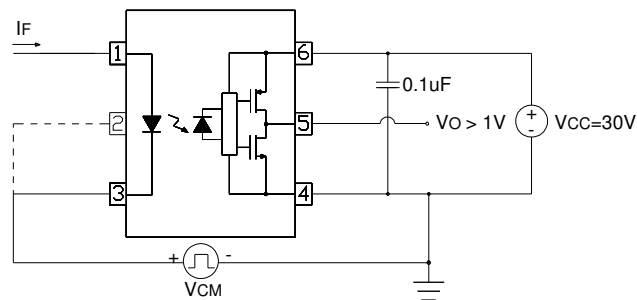


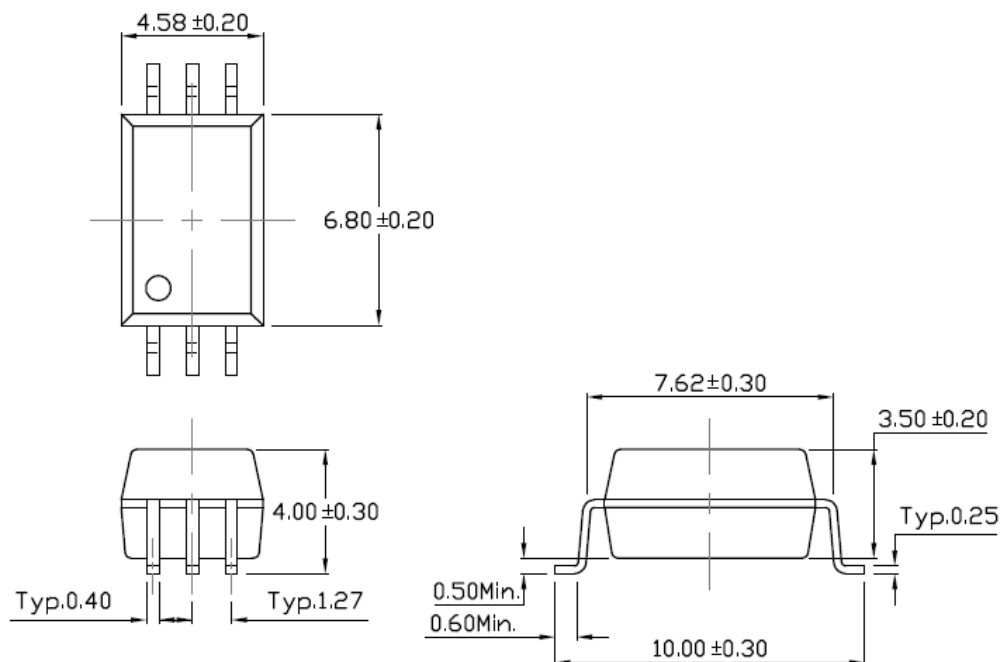
Fig. 20 Test circuit for Common mode Transient Immunity



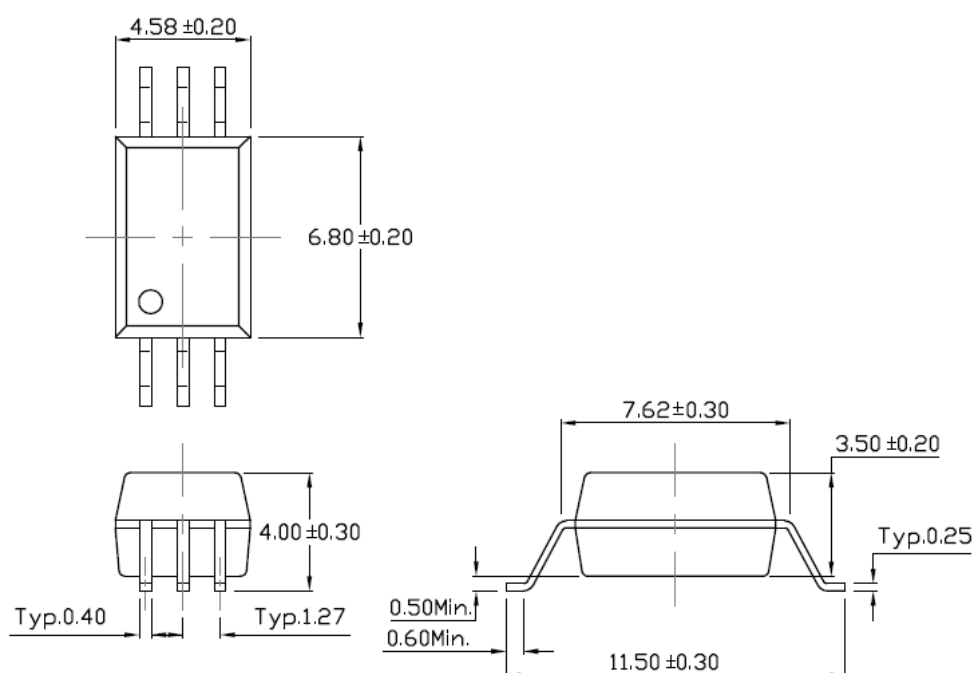
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Package Dimension *Dimensions in mm unless otherwise stated*

Surface Mount Lead Forming

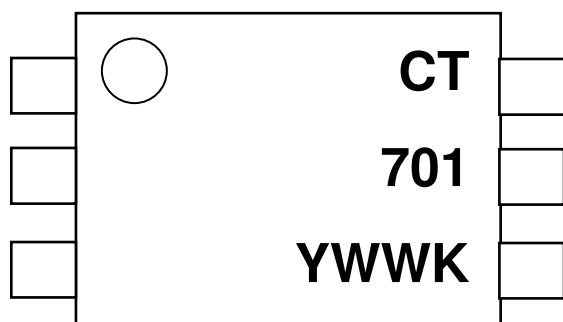


Surface Mount (Gullwing) Lead Forming (SM Type)





Device Marking

**Note:**

CT : Denotes “CT Micro”

701 : Part Number

Y : Fiscal Year

WW : Work Week

K : Manufacturing Code

Ordering Information

CTS701(Y)(Z)

Y = Lead form option (SM or none)

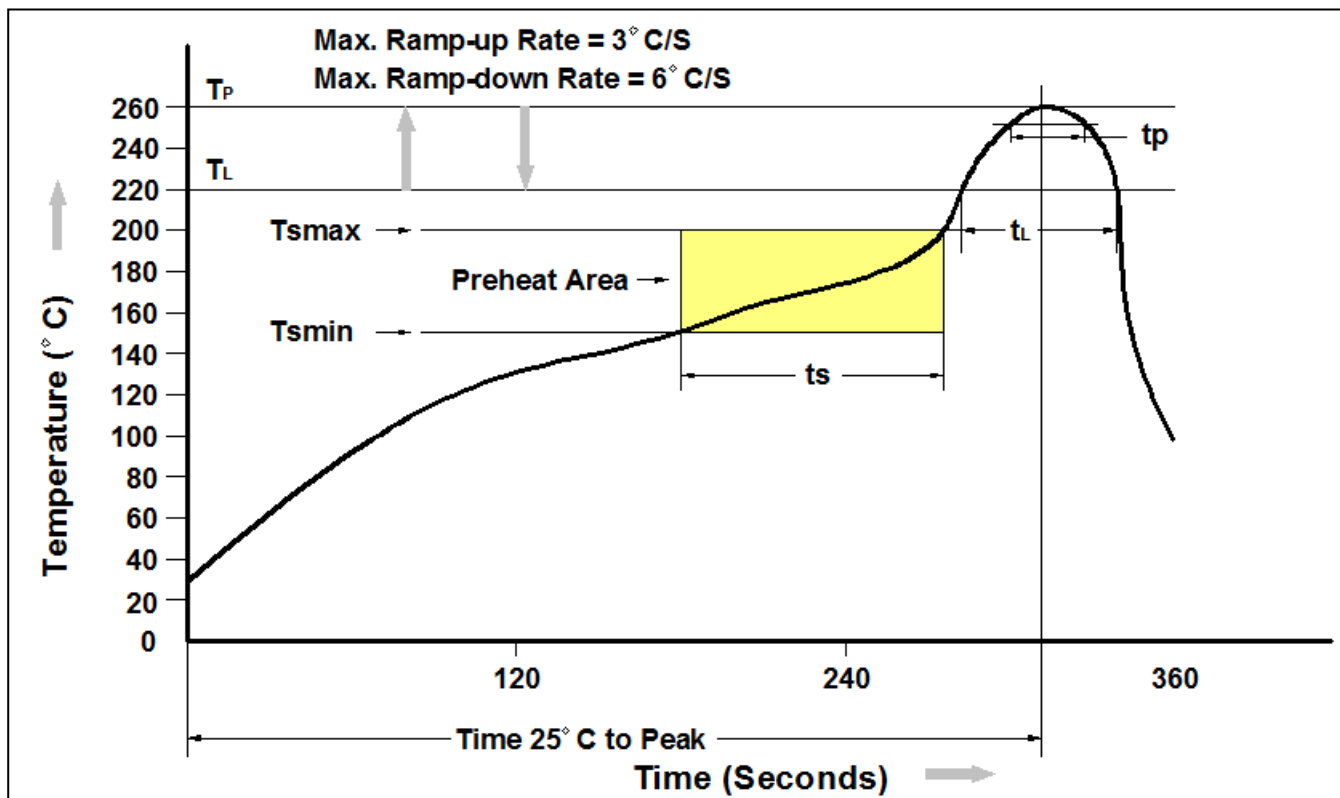
Z = Tape and reel option (T1, T2)

Option	Description	Quantity
(T1)	Option 1 Taping	1500 Units/Reel
(T2)	Option 2 Taping	1500 Units/Reel
(SM)(T1)	Option 1 Taping	1500 Units/Reel
(SM)(T2)	Option 2 Taping	1500 Units/Reel



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Reflow Profile



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.



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