



6N137

10MBit/s High Speed Logic Gate Optocoupler

Features

- High speed 10MBit/s
- High isolation voltage between input and output (Viso=5000 Vrms)
- Guaranteed performance from -40°C to 85°C
- Wide operating temperature range of -55°C to 100°C
- Regulatory Approvals
 - UL - UL1577 (E364000)
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC – GB4943.1, GB8898
 - IEC60065, IEC60950

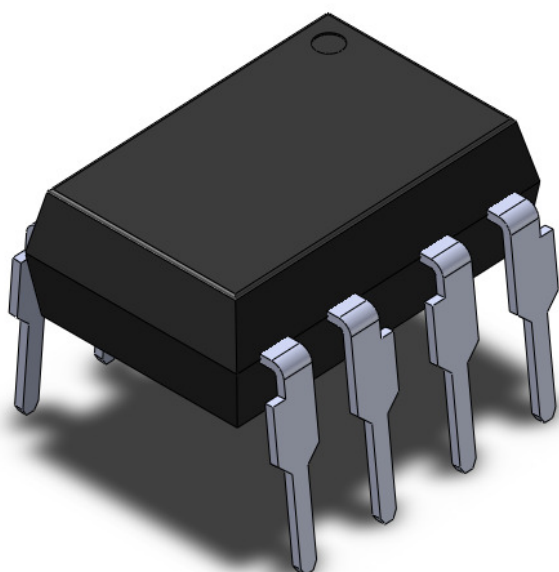
Description

The 6N137 optocouplers consist of a 850 nm AlGaAS LED, optically coupled to a very high speed integrated photo-detector logic gate with a strobable output. This output features an open collector, there by permitting wired OR outputs. The switching parameters are guaranteed over the temperature range of -40°C to +85°C. A maximum input signal of 5mA will provide a minimum output sink current of 13mA (fan out of 8).

Applications

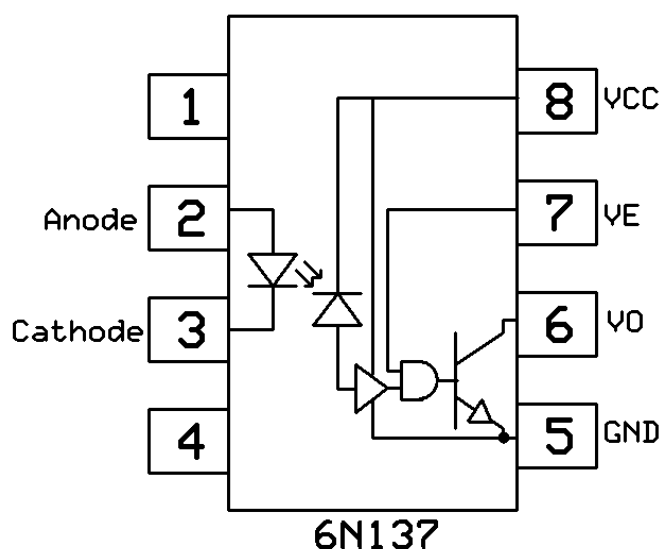
- Line receivers
- Telecommunication equipment
- Feedback loop in switch-mode power supplies
- Home appliances
- High speed logic ground isolation

Package Outline



Note: Different lead forming options available. See package dimension.

Schematic



**6N137****10MBit/s High Speed Logic Gate Optocoupler****Absolute Maximum Rating at 25°C**

Symbol	Parameters	Ratings	Units	Notes
V _{ISO}	Isolation voltage *1	5000	V _{RMS}	
T _{OPR}	Operating temperature	-55 ~ +100	°C	
T _{STG}	Storage temperature	-55 ~ +125	°C	
T _{SOL}	Soldering temperature *2	260	°C	
Emitter				
I _F	Forward current	50	mA	
V _R	Reverse voltage	5	V	
P _I	Power dissipation	100	mW	
Detector				
P _O	Power dissipation	85	mW	
I _O	Average Output current	50	mA	
V _O	Output voltage	7.0	V	1min(Max.)
V _{CC}	Supply voltage	7.0	V	
V _E	Enable Input Voltage Not to Exceed VCC by more than 500mV	5.5	V	



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Electrical Characteristics

$T_A = -40 - 85^\circ\text{C}$ (unless otherwise specified). Typical values are measured at $T_A = 25^\circ\text{C}$ and $V_{CC}=5\text{V}$

Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V_F	Forward voltage	$I_F = 10\text{mA}$	-	1.4	1.6	V	
V_R	Reverse Voltage	$I_R = 10\mu\text{A}$	5.0	-	-	V	
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage	$I_F = 10\text{mA}$	-	-1.8	-	mV/ $^\circ\text{C}$	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
I_{CCH}	Logic High Supply Current	$I_F=0\text{mA}$, $V_E=0.5\text{V}$, $V_{CC}=5.5\text{V}$	-	6.5	10	mA	
I_{CCL}	Logic Low Supply Current	$I_F=10\text{mA}$, $V_E=0.5\text{V}$, $V_{CC}=5.5\text{V}$	-	8.8	13	mA	
V_{EH}	High Level Enable Voltage	$I_F=10\text{mA}$, $V_{CC}=5.5\text{V}$	2.0	-	-	V	
V_{EL}	Low Level Enable Voltage	$I_F=10\text{mA}$, $V_{CC}=5.5\text{V}$	-	-	0.8	V	
I_{EH}	High Level Enable Current	$V_E=2.0\text{V}$, $V_{CC}=5.5\text{V}$	-	-0.53	-1.6	mA	
I_{EL}	Low Level Enable Current	$V_E=0.5\text{V}$, $V_{CC}=5.5\text{V}$	-	-0.75	-1.6	mA	

Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
I_{FT}	Input Threshold Current	$V_{CC}=5.5\text{V}$, $V_O=0.6\text{V}$, $V_E=2.0\text{V}$, $I_O=13\text{mA}$	-	2.5	5	mA	
I_{OH}	Logic High Output Current	$I_F=250\mu\text{A}$, $V_O=V_{CC}=5.5\text{V}$, $V_E=2.0\text{V}$	-	2.0	100	μA	
V_{OL}	Low Level Output Voltage	$I_F=5\text{mA}$, $V_{CC}=5.5\text{V}$, $V_E=2.0\text{V}$, $I_O=13\text{mA}$	-	0.35	0.6	V	

**10MBit/s High Speed Logic Gate Optocoupler****Electrical Characteristics**

$T_A = -40 - 85^\circ\text{C}$ (unless otherwise specified). Typical values are measured at $T_A = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$ and $I_F = 7.5\text{mA}$

Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
T_{PHL}	Output Propagation Delay High to Low	$C_L = 15\text{pF}$, $R_L = 350\Omega$	-	34	75	ns	
T_{PLH}	Output Propagation Delay Low to High		-	39	75	ns	
P_{WD}	Pulse Width Distortion		-	5	34	ns	
T_r	Output Rise Time		-	37	-	ns	
T_f	Output Fall Time		-	10	-	ns	
T_{ELH}	Enable Propagation Delay Low To High	$V_{EH} = 3.5\text{V}$, $C_L = 15\text{pF}$, $R_L = 350\Omega$	-	15	-	ns	
T_{EHL}	Enable Propagation Delay High To Low		-	15	-	ns	
CM_H	Common Mode Transient Immunity at Logic High	$I_F = 0\text{mA}$, $V_{CM} = 50\text{Vp-p}$, $V_{OH} = 2.0\text{V}$, $R_L = 350\Omega$	5000	-	-	V/ μs	
CM_L	Common Mode Transient Immunity at Logic Low	$I_F = 7.5\text{mA}$, $V_{CM} = 50\text{Vp-p}$, $V_{OL} = 0.8\text{V}$, $R_L = 350\Omega$	5000	-	-	V/ μs	



Typical Characteristic Curves

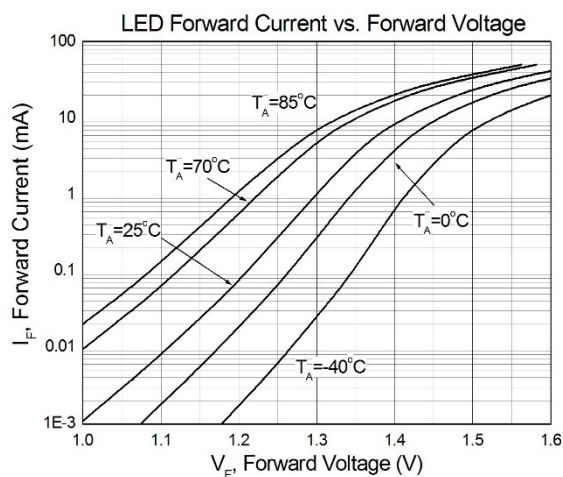


Figure 1

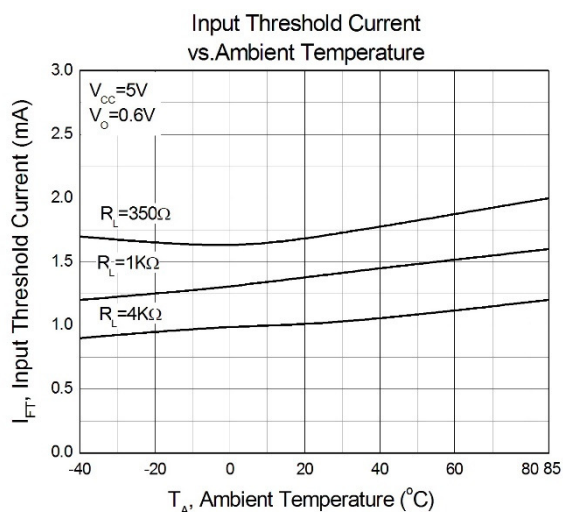


Figure 2

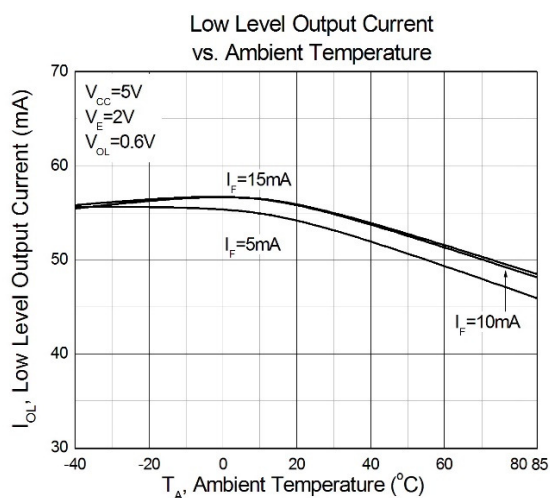


Figure 3

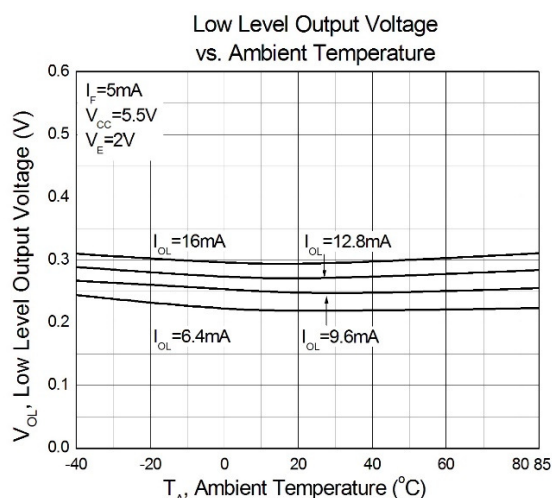


Figure 4

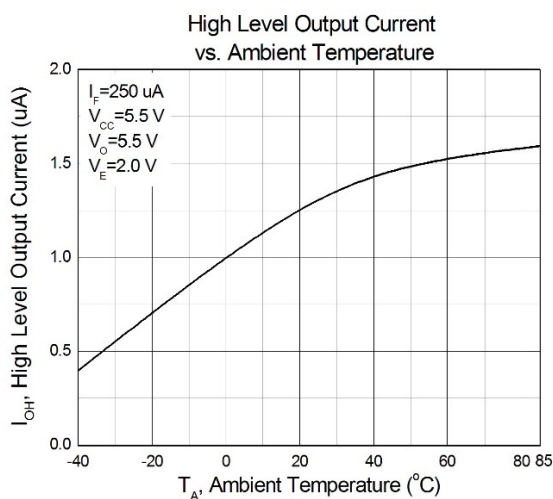


Figure 5

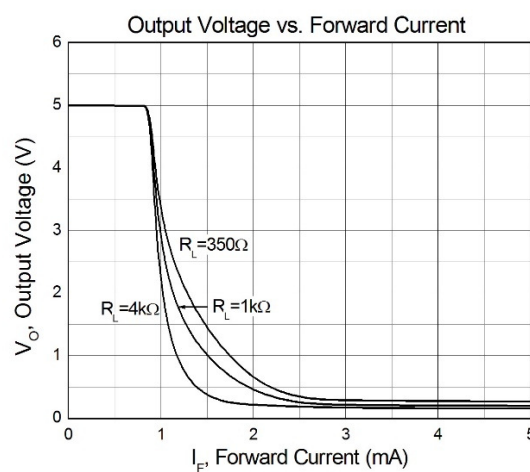


Figure 6



Typical Characteristic Curves

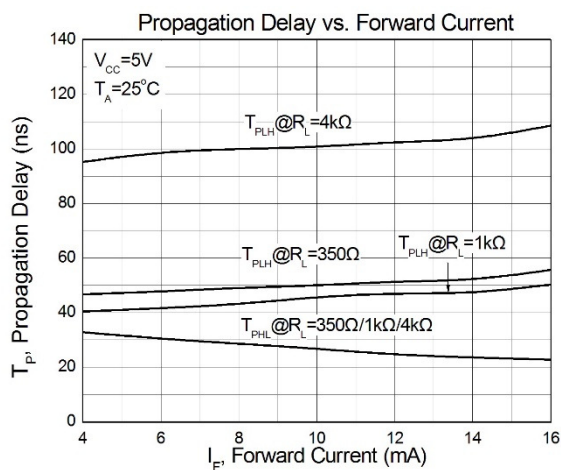


Figure 7

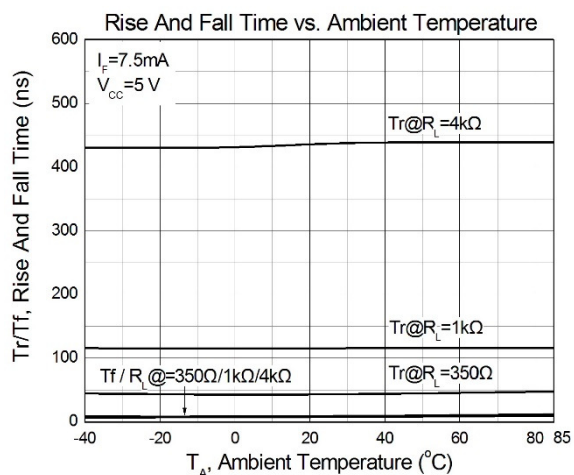


Figure 8

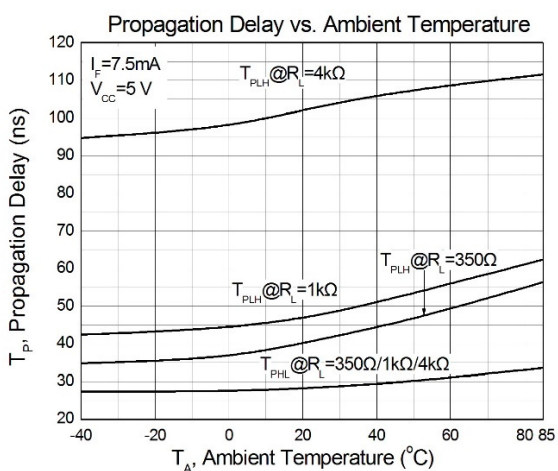


Figure 9

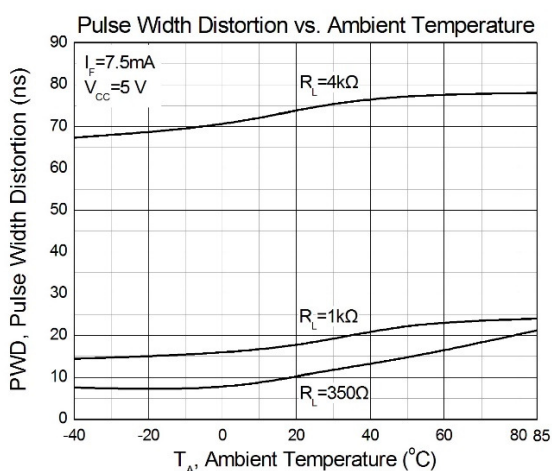


Figure 10

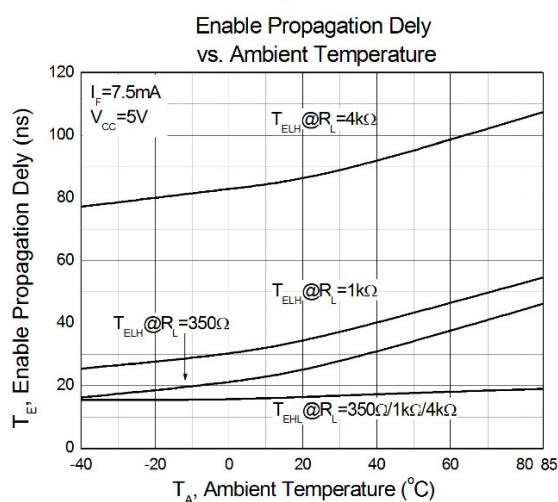


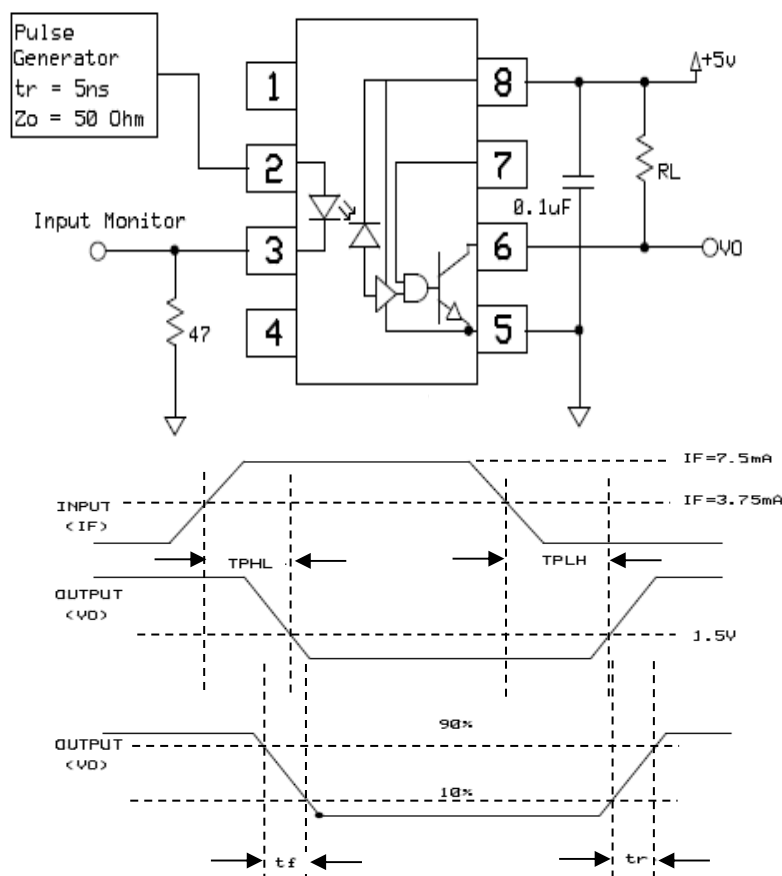
Figure 11



6N137

10MBit/s High Speed Logic Gate Optocoupler

Test Circuits



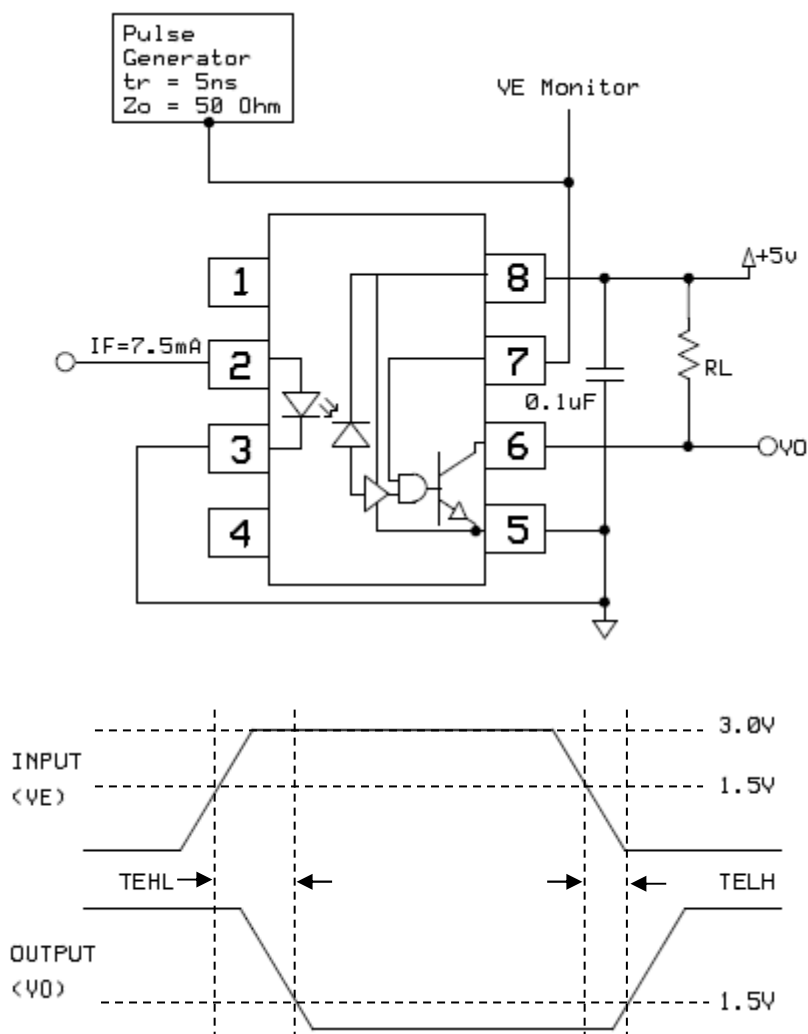
Switching Time Test Circuit



6N137

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Test Circuits



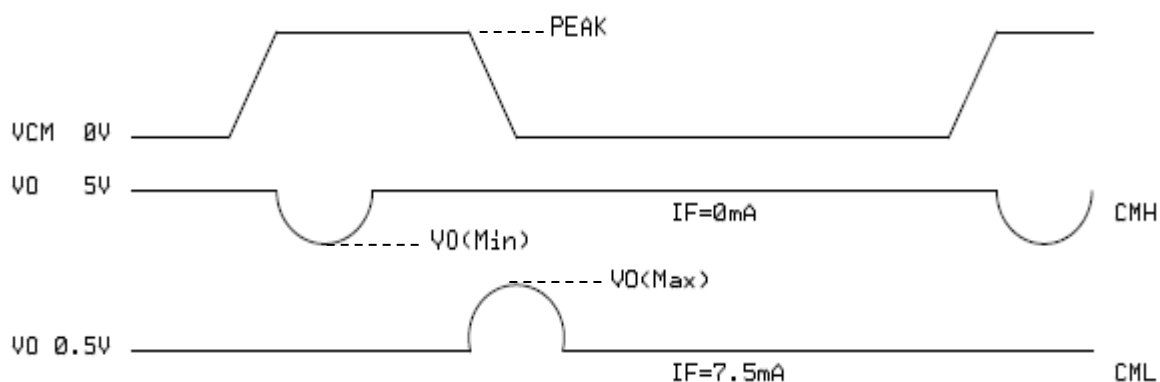
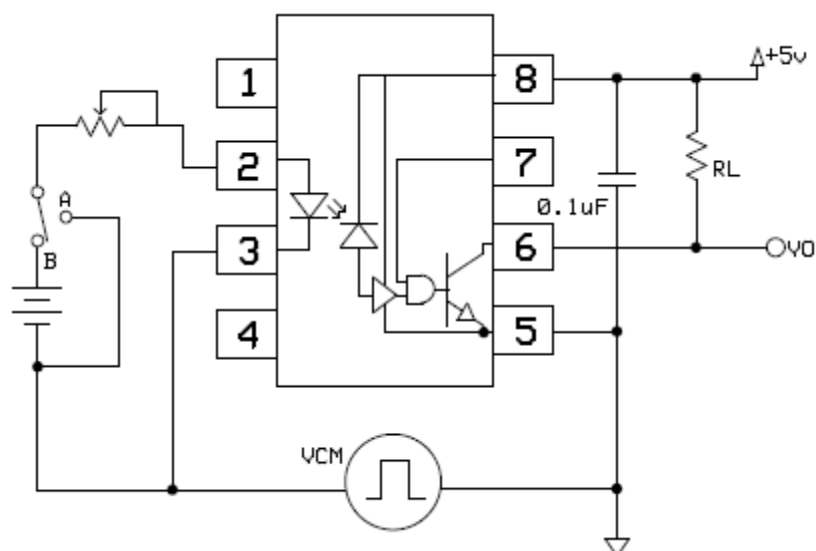
Enable Switching Time Test Circuit



6N137

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Test Circuits



CMR Test Circuit

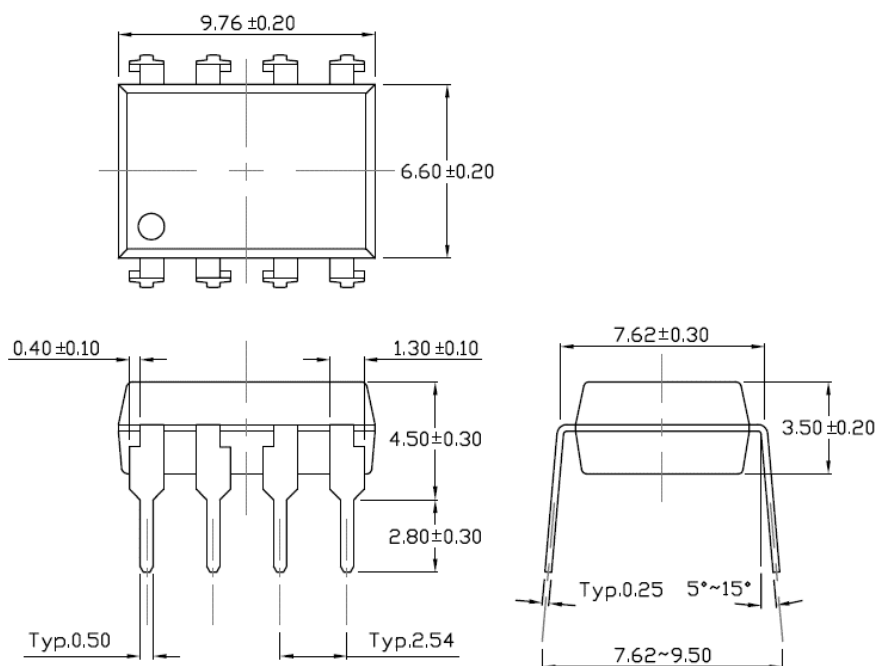


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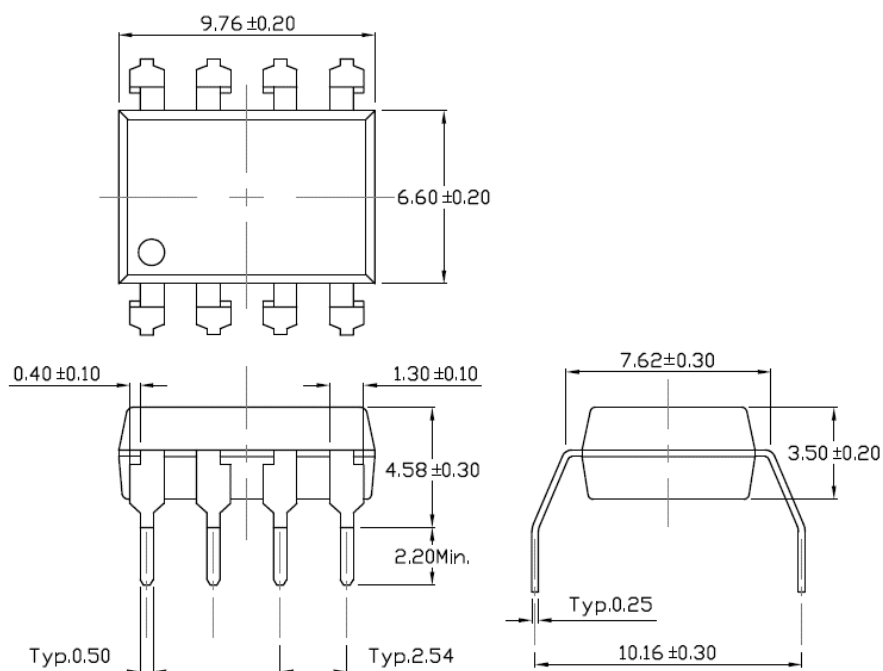
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Package Dimension *Dimensions in mm unless otherwise stated*

Standard DIP – Through Hole



Gullwing (400mil) Lead Forming – Through Hole (M Type)

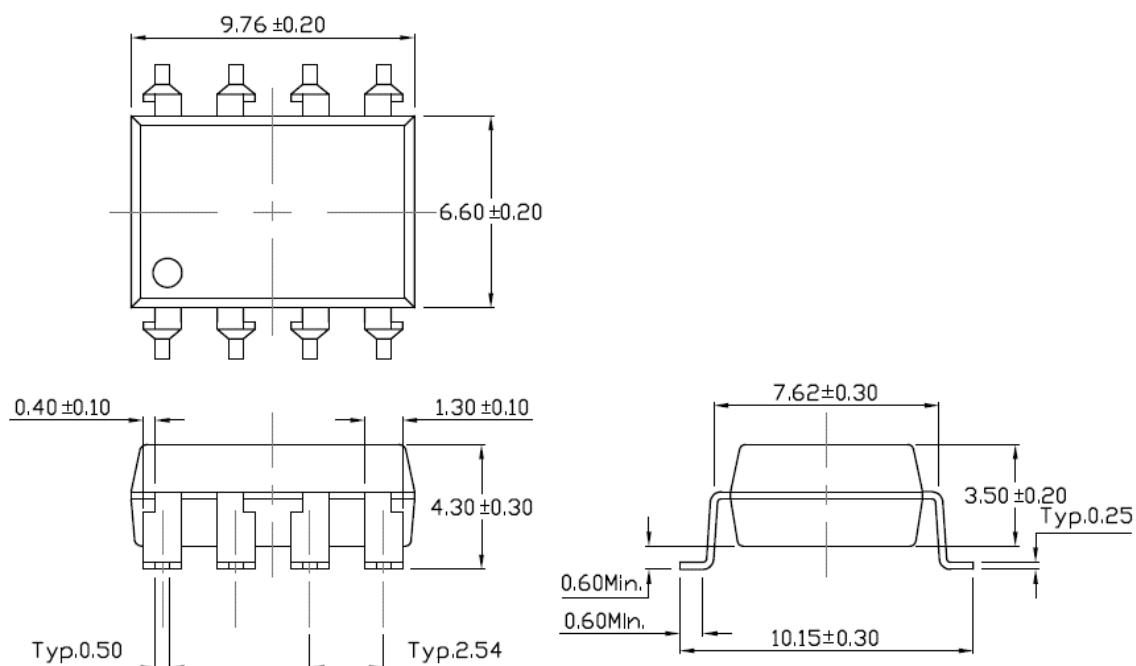




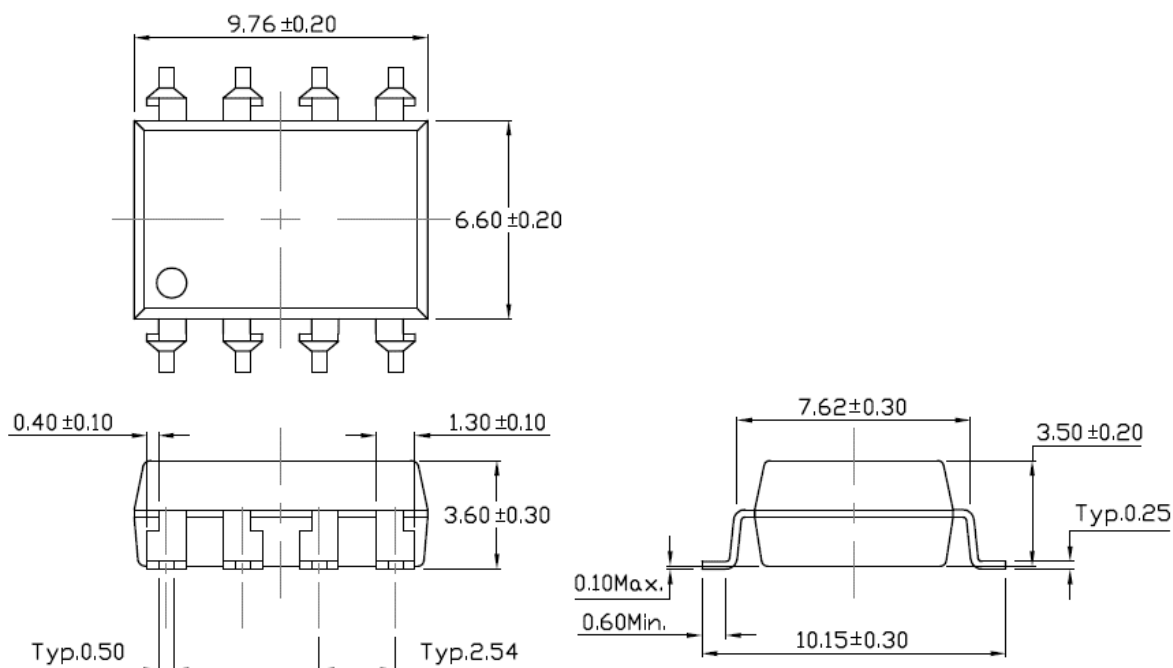
6N137

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Surface Mount Lead Forming (S Type)



Surface Mount (Low Profile) Lead Forming (SL Type)

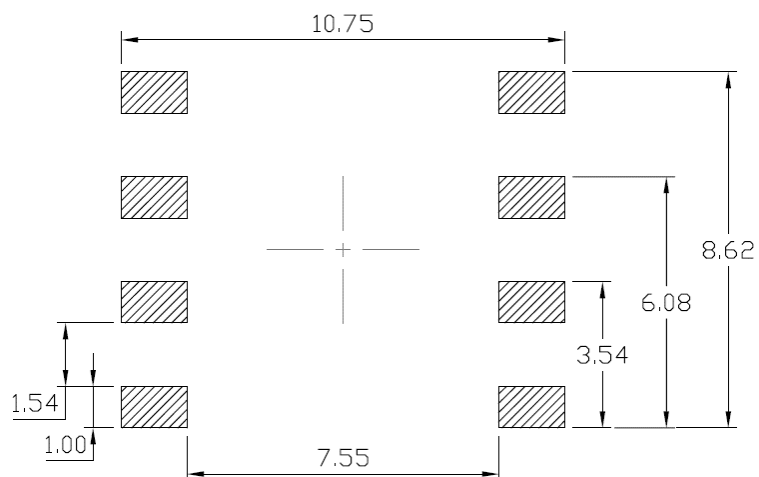




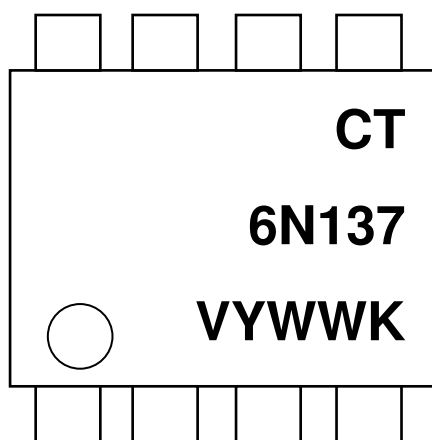
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10MBit/s High Speed Logic Gate Optocoupler

Recommended Solder Mask *Dimensions in mm unless otherwise stated*



Device Marking



Note:

- CT : Denotes "CT Micro"
- 6N137 : Product Number
- V : VDE Option
- Y : Fiscal Year
- WW : Work Week
- K : Production Code



6N137

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Ordering Information

6N137(V)(Y)(Z)

V = VDE Option (V or None)

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

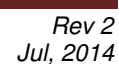
Z = Tape and reel option (T1, T2 or none)

<i>Option</i>	<i>Description</i>	<i>Quantity</i>
None	Standard 8 Pin Dip	40 Units/Tube
M	Gullwing (400mil) Lead Forming	40 Units/Tube
S(T1)	Surface Mount Lead Forming – With Option 1 Taping	1000 Units/Reel
S(T2)	Surface Mount Lead Forming – With Option 2 Taping	1000 Units/Reel
SL(T1)	Surface Mount (Low Profile) Lead Forming– With Option 1 Taping	1000 Units/Reel
SL(T2)	Surface Mount (Low Profile) Lead Forming– With Option 2 Taping	1000 Units/Reel



Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

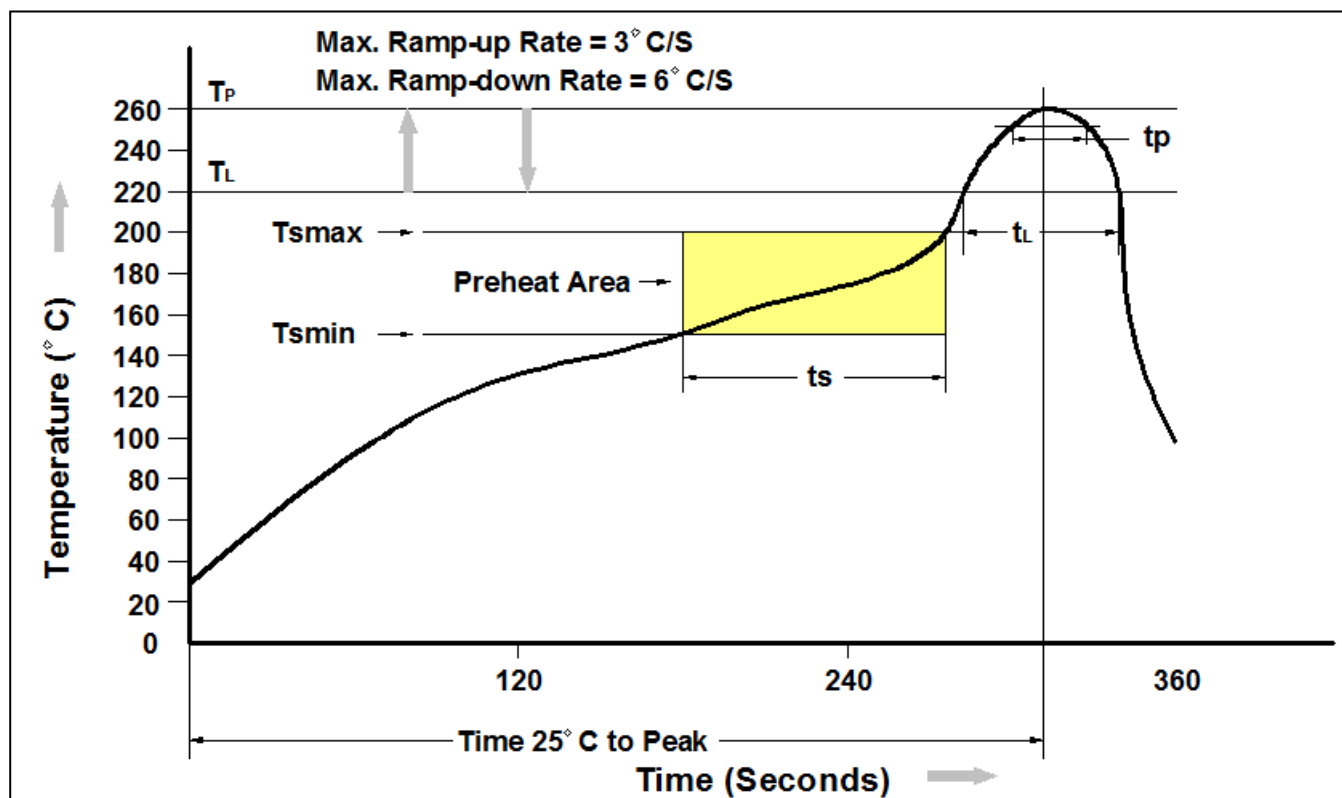
Input Direction





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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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