



## 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

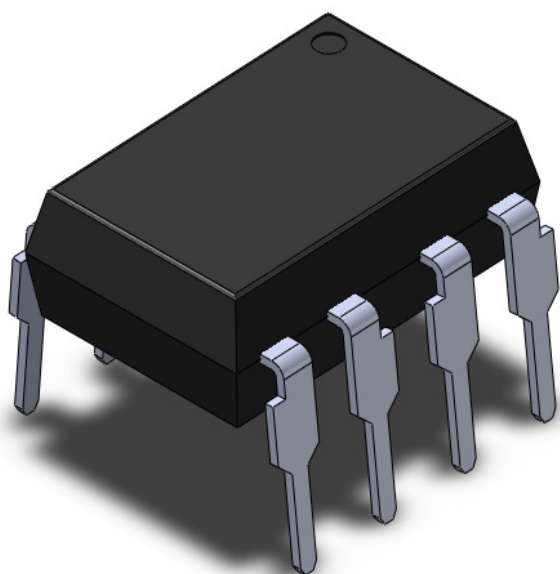
### Description

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).

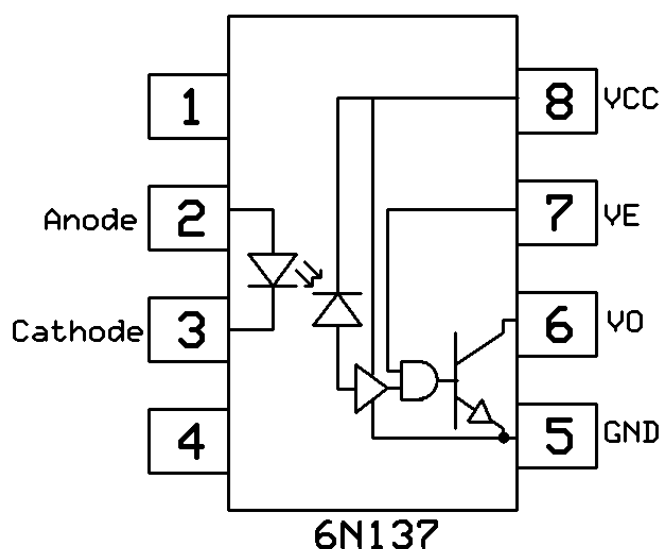
### Applications

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

### Package Outline



### Schematic



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



6N137

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### Absolute Maximum Rating at 25°C

<b>Symbol</b>	<b>Parameters</b>	<b>Ratings</b>	<b>Units</b>	<b>Notes</b>
V <sub>ISO</sub>	Isolation voltage *1	5000	V <sub>RMS</sub>	
T <sub>OPR</sub>	Operating temperature	-55 ~ +100	°C	
T <sub>STG</sub>	Storage temperature	-55 ~ +125	°C	
T <sub>SOL</sub>	Soldering temperature *2	260	°C	
<b>Emitter</b>				
I <sub>F</sub>	Forward current	50	mA	
V <sub>R</sub>	Reverse voltage	5	V	
P <sub>I</sub>	Power dissipation	100	mW	
<b>Detector</b>				
P <sub>O</sub>	Power dissipation	85	mW	
I <sub>O</sub>	Average Output current	50	mA	
V <sub>O</sub>	Output voltage	7.0	V	1min(Max.)
V <sub>CC</sub>	Supply voltage	7.0	V	
V <sub>E</sub>	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	$\mu\text{A}$	
$V_{OL}$	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	



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**Electrical Characteristics**

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



Typical Characteristic Curves

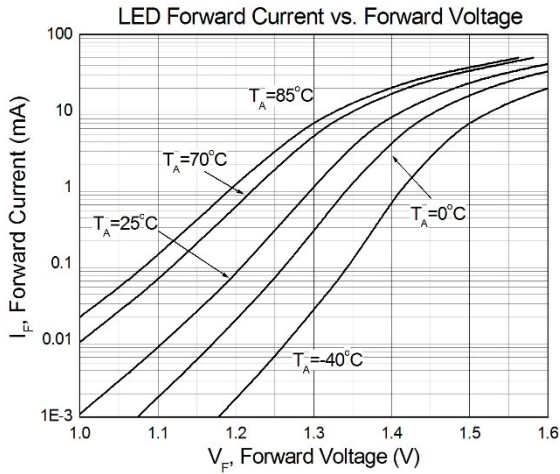


Figure 1

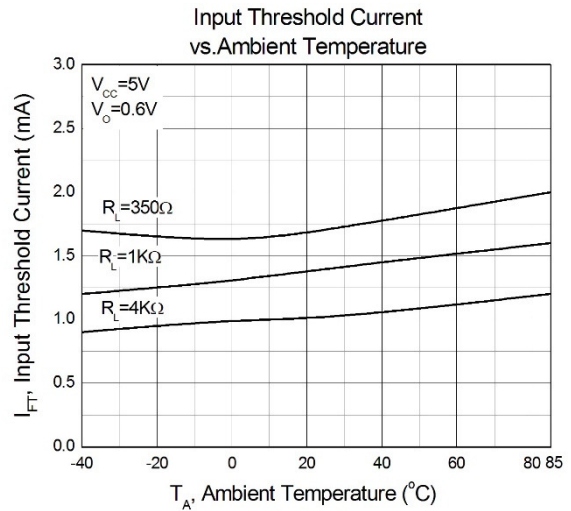


Figure 2

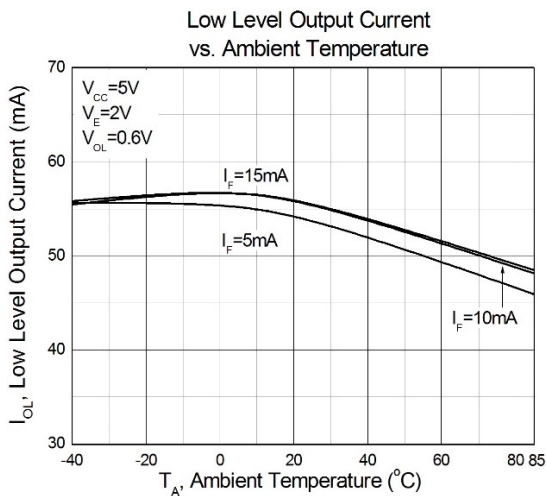


Figure 3

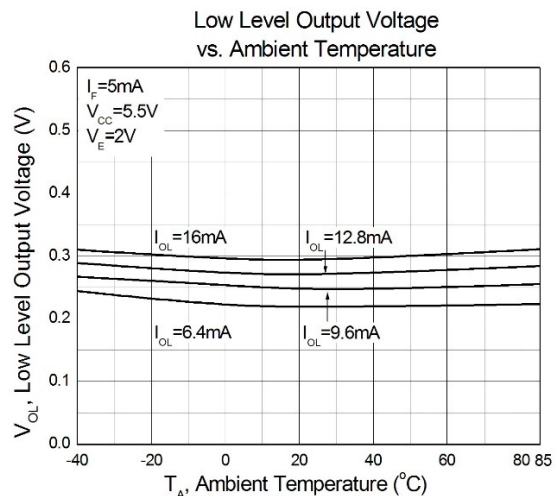


Figure 4

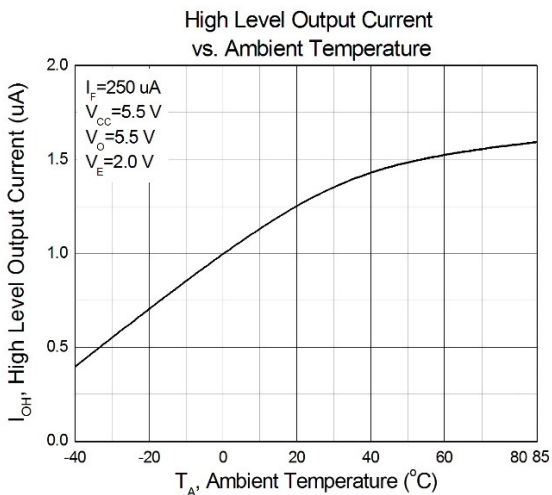


Figure 5

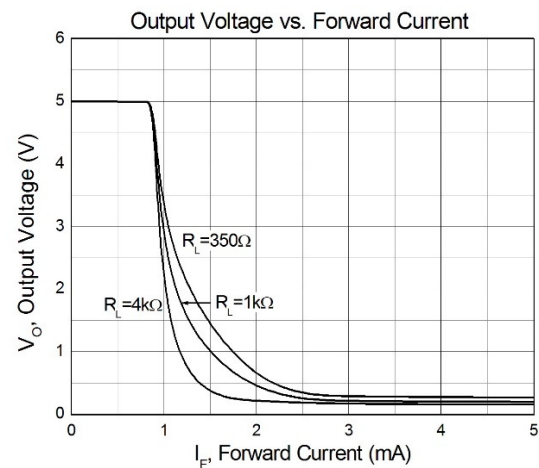
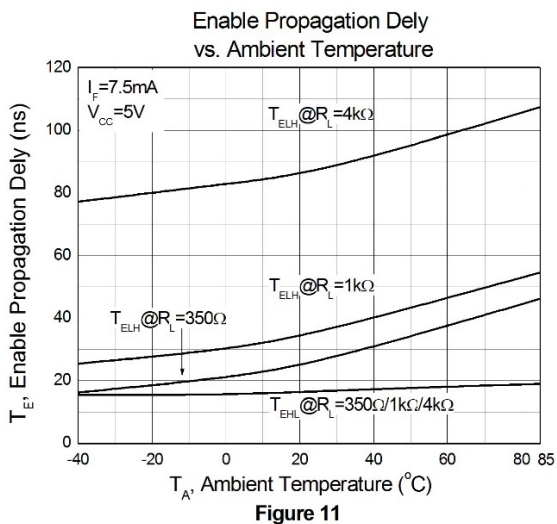
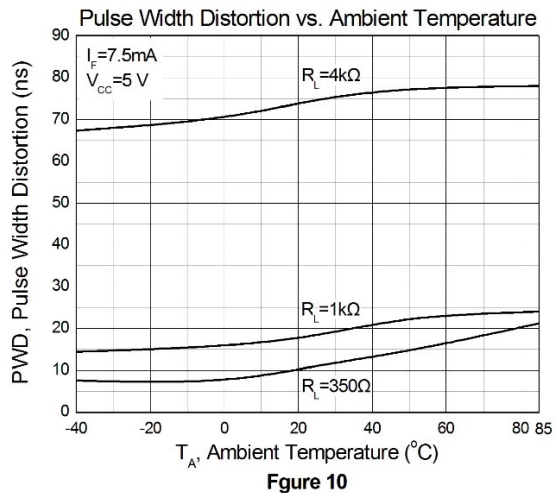
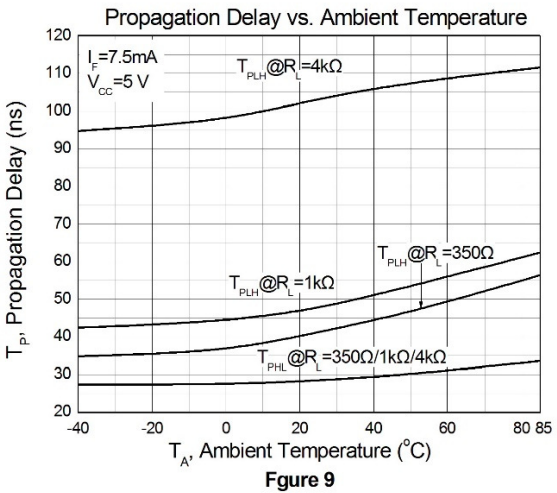
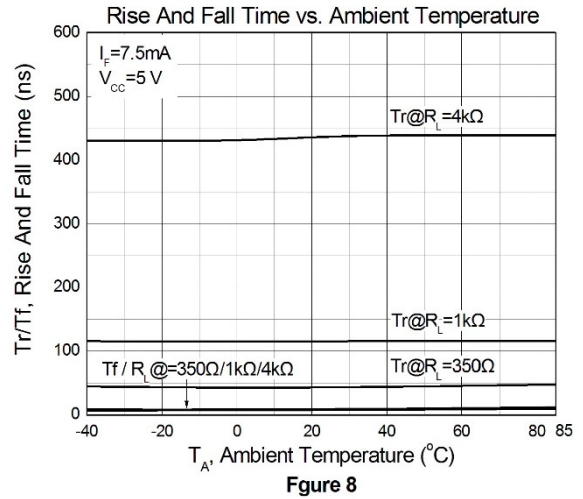
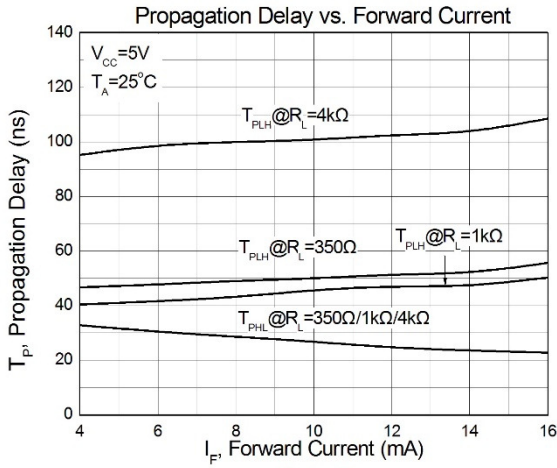


Figure 6



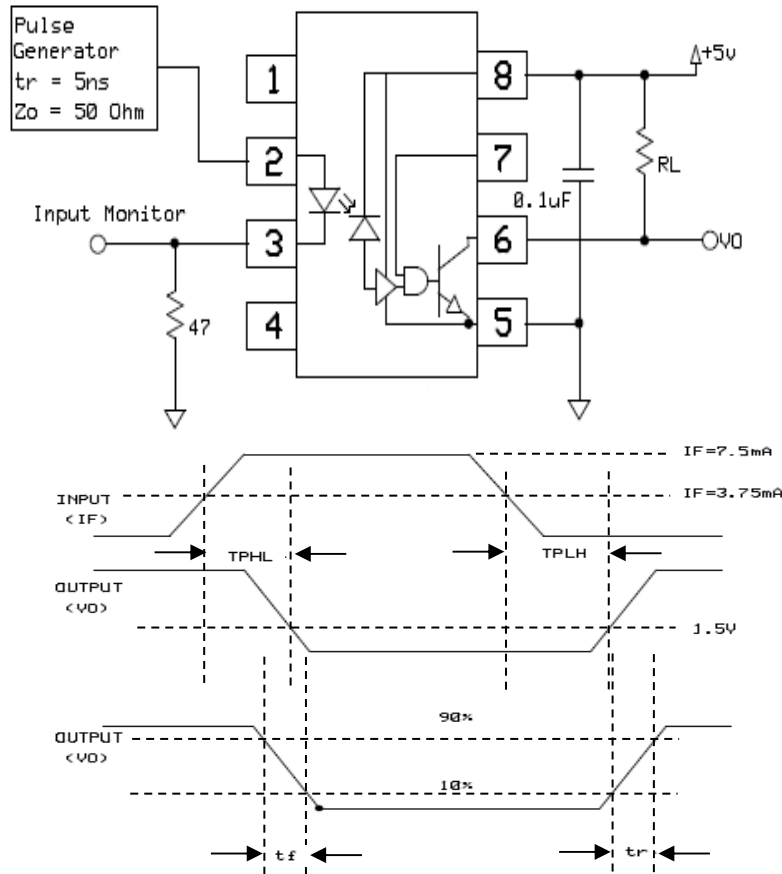
Typical Characteristic Curves





# 10MBit/s High Speed Logic Gate Optocoupler

## Test Circuits

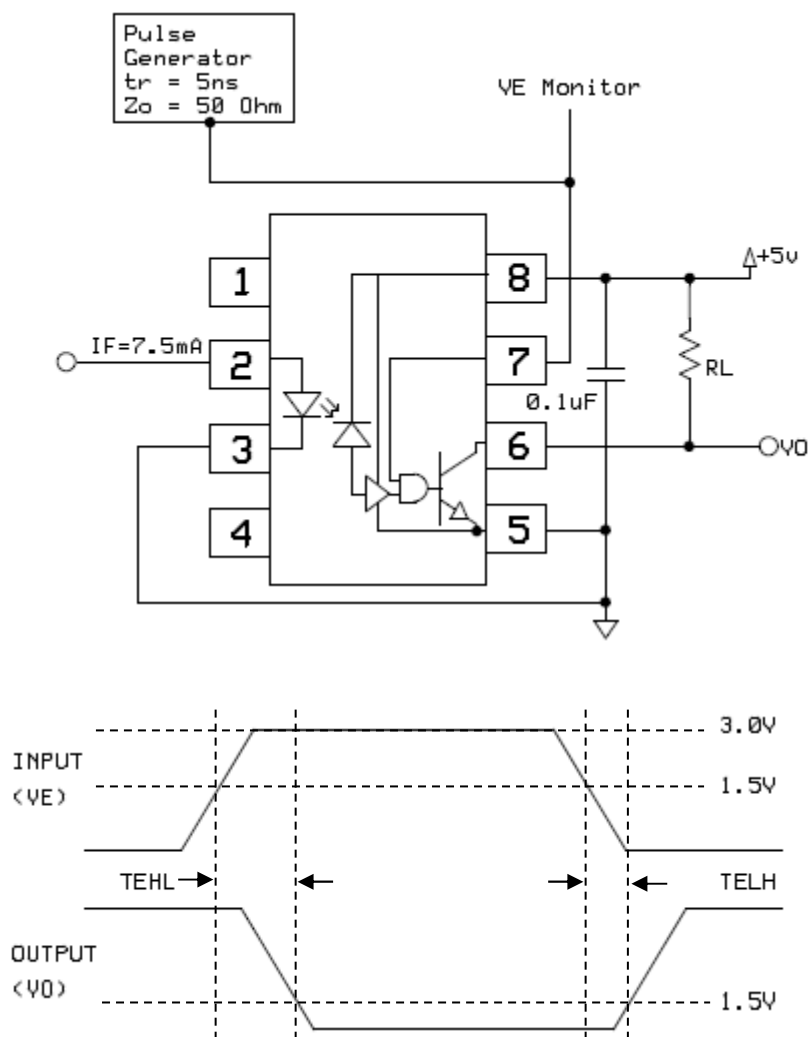


Switching Time Test Circuit



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## Test Circuits

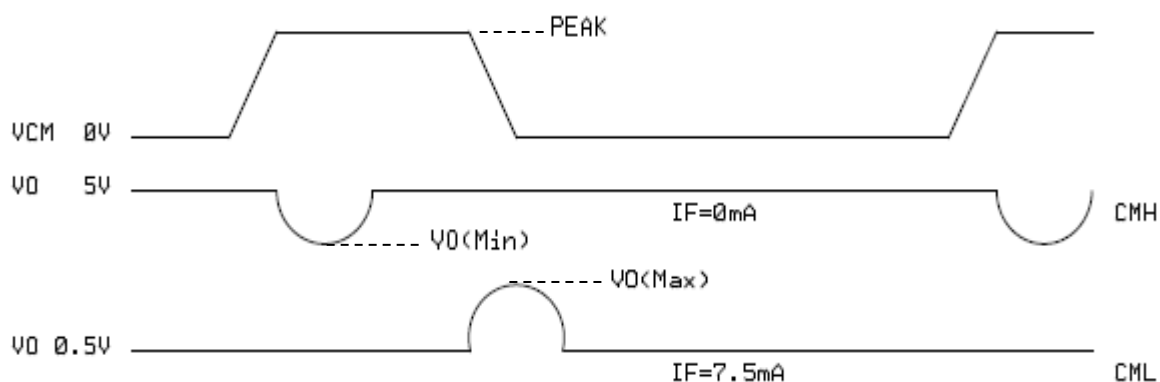
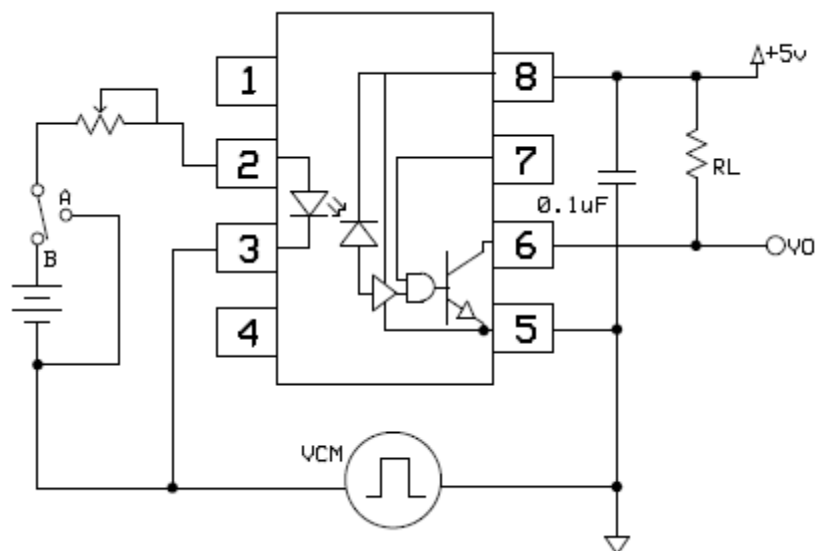


Enable Switching Time Test Circuit





Test Circuits

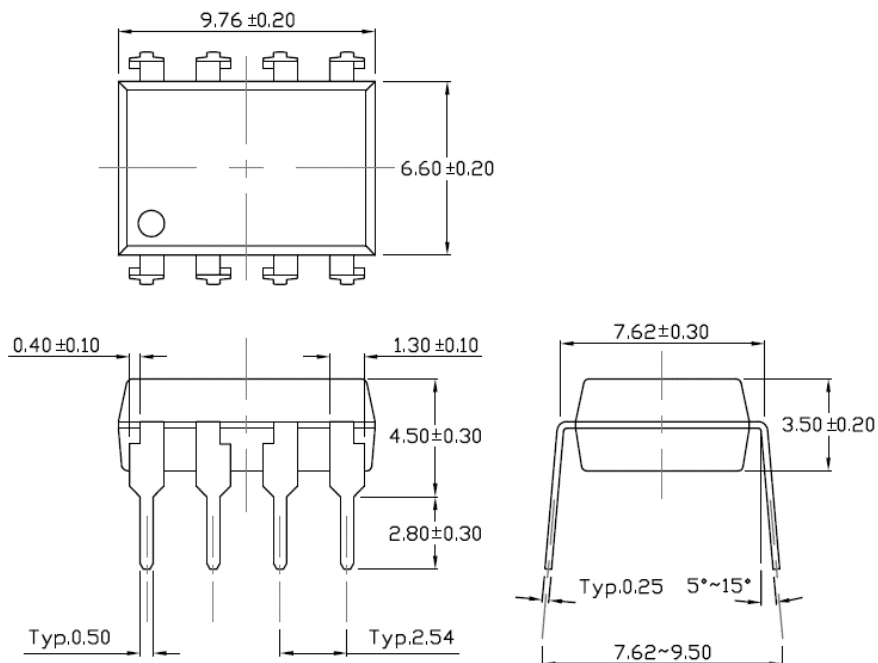


CMR Test Circuit

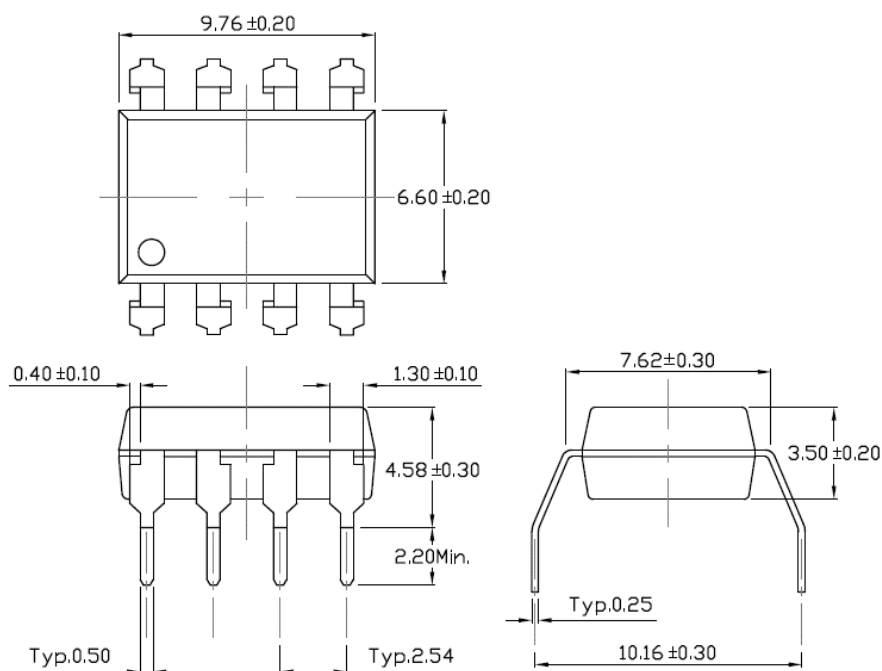


**Package Dimension** *Dimensions in mm unless otherwise stated*

**Standard DIP – Through Hole**



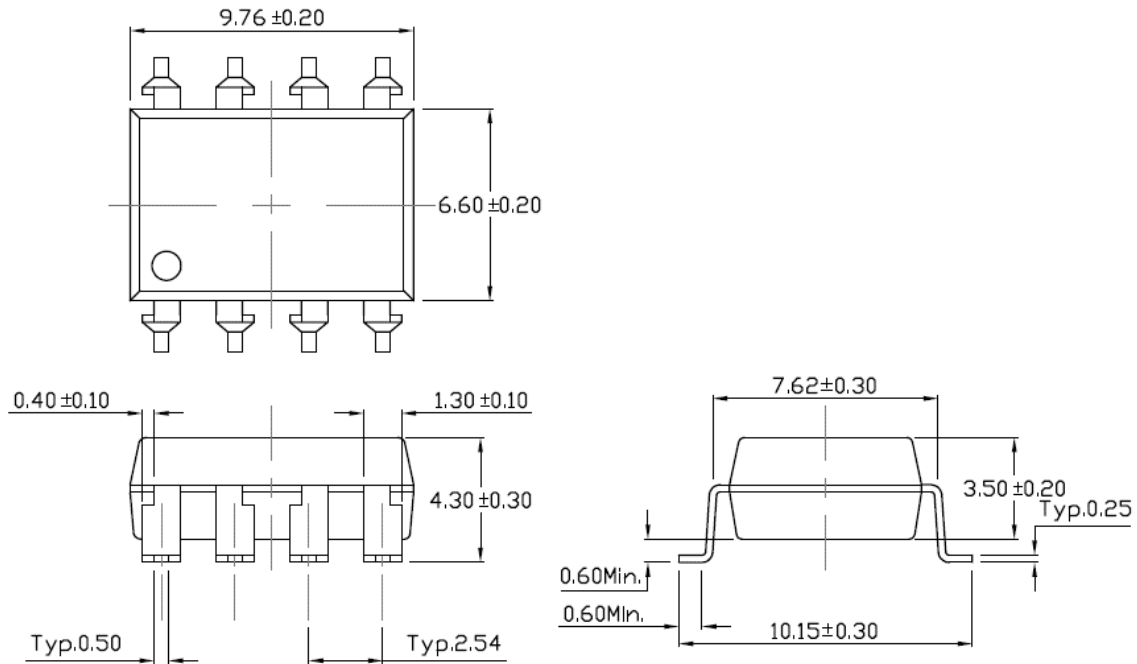
**Gullwing (400mil) Lead Forming – Through Hole (M Type)**



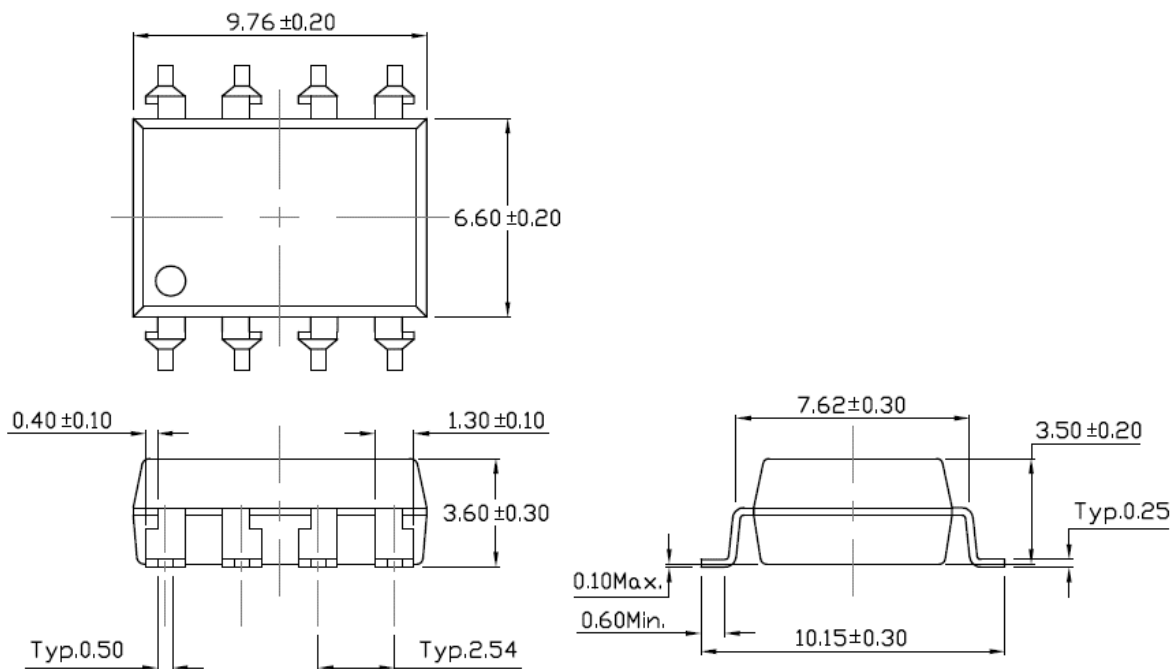


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## Surface Mount Lead Forming (S Type)



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

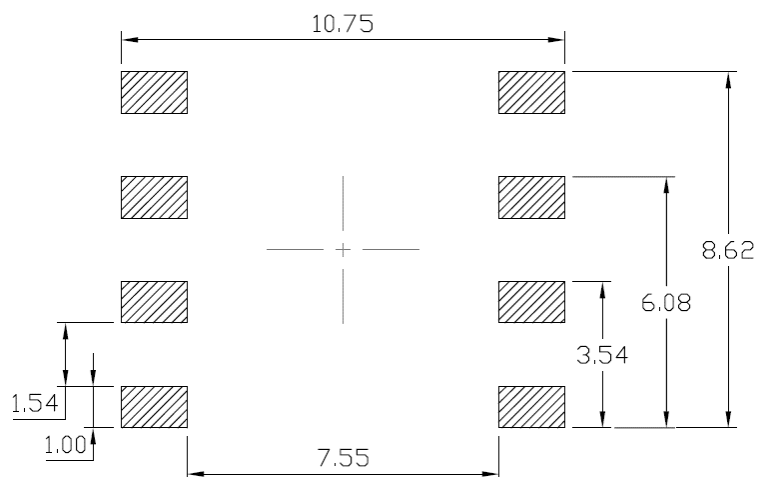




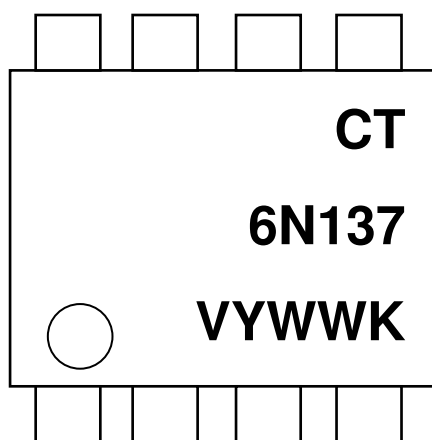
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## 10MBit/s High Speed Logic Gate Optocoupler

### 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

## 10MBit/s High Speed Logic Gate Optocoupler

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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)

<b>Option</b>	<b>Description</b>	<b>Quantity</b>
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

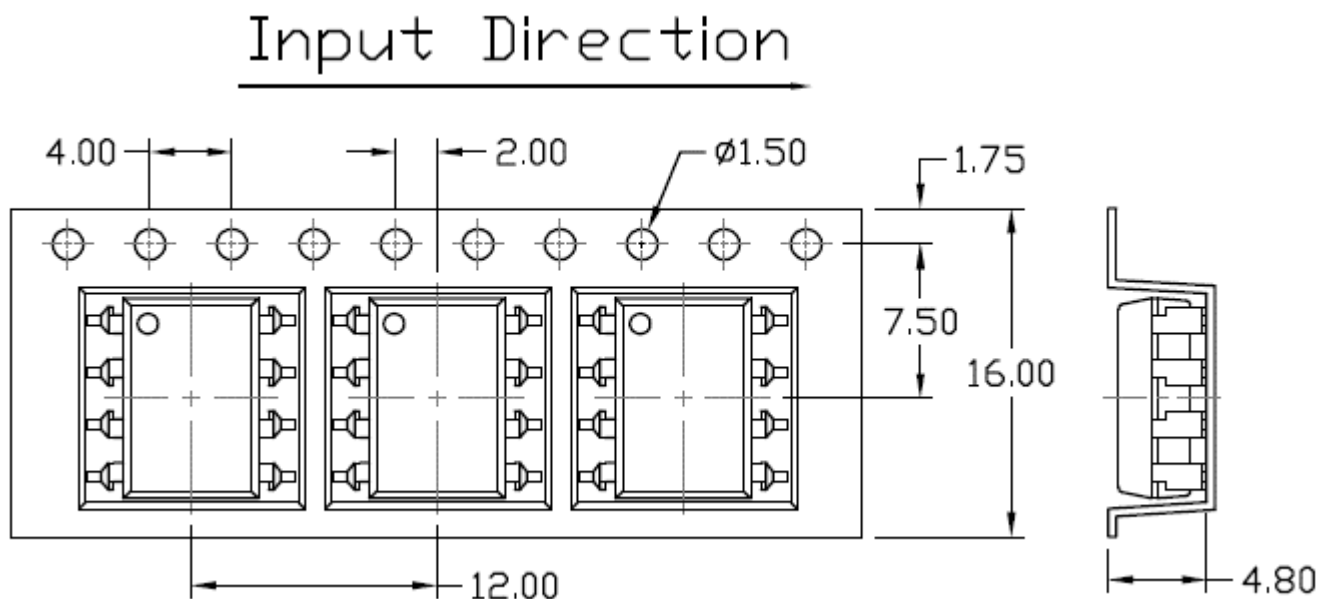


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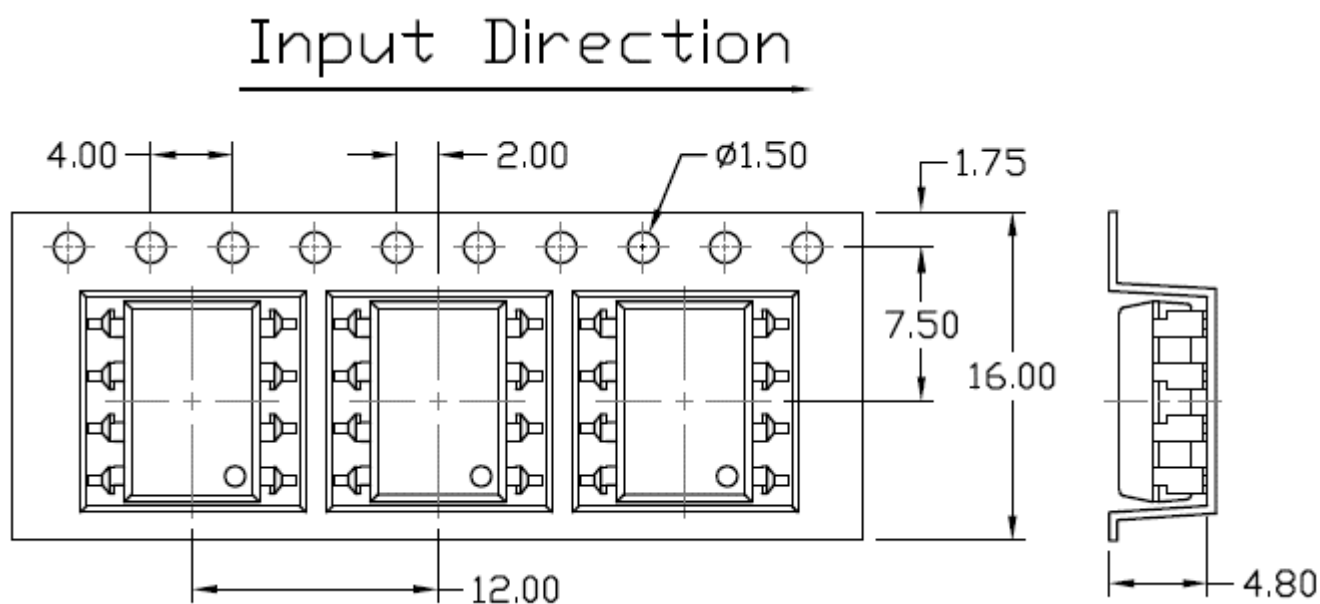
## 10MBit/s High Speed Logic Gate Optocoupler

### Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

#### Option S(T1) & SL(T1)



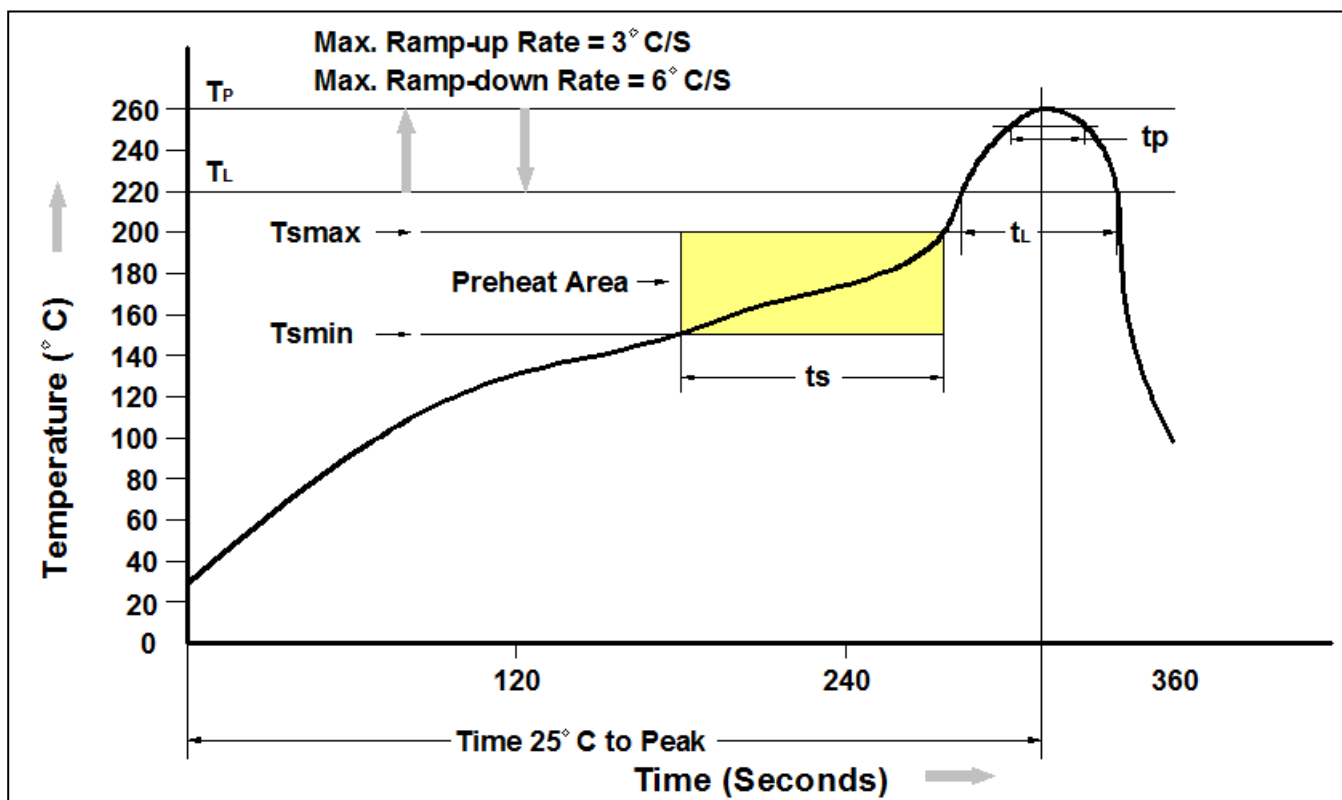
#### Option S(T2) & SL(T2)





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## Reflow Profile



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



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