

4N25M, 4N26M, 4N27M, 4N28M, 4N35M, 4N36M, 4N37M, H11A1M, H11A2M, H11A3M, H11A4M, H11A5M General Purpose 6-Pin Phototransistor Optocouplers

Features

- UL recognized (File # E90700, Volume 2)
- VDE recognized (File # 102497)
 - Add option V (e.g., 4N25VM)

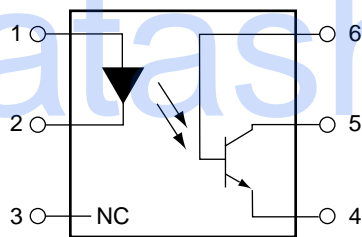
Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

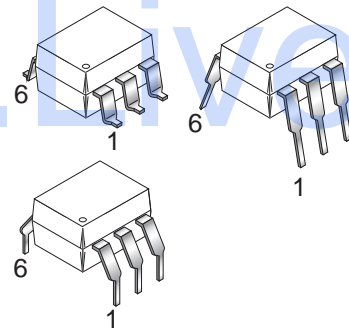
Description

The general purpose optocouplers consist of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a 6-pin dual in-line package.

Functional Block Diagram



- PIN 1. ANODE
2. CATHODE
3. NO CONNECTION
4. EMITTER
5. COLLECTOR
6. BASE



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Units
TOTAL DEVICE			
T_{STG}	Storage Temperature	-55 to +150	$^\circ\text{C}$
T_{OPR}	Operating Temperature	-55 to +100	$^\circ\text{C}$
T_{SOL}	Wave solder temperature (see page 8 for reflow solder profile)	260 for 10 sec	$^\circ\text{C}$
P_D	Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	250	mW
		2.94	
EMITTER			
I_F	DC/Average Forward Input Current	60	mA
V_R	Reverse Input Voltage	6	V
$I_F(\text{pk})$	Forward Current – Peak (300 μs , 2% Duty Cycle)	3	A
P_D	LED Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	120	mW
		1.41	mW/ $^\circ\text{C}$
DETECTOR			
V_{CEO}	Collector-Emitter Voltage	30	V
V_{CBO}	Collector-Base Voltage	70	V
V_{ECO}	Emitter-Collector Voltage	7	V
P_D	Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	150	mW
		1.76	mW/ $^\circ\text{C}$

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise specified)**Individual Component Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Unit
EMITTER						
V_F	Input Forward Voltage	$I_F = 10\text{mA}$		1.18	1.50	V
I_R	Reverse Leakage Current	$V_R = 6.0\text{V}$		0.001	10	μA
DETECTOR						
BV_{CEO}	Collector-Emitter Breakdown Voltage	$I_C = 1.0\text{mA}$, $I_F = 0$	30	100		V
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = 100\mu\text{A}$, $I_F = 0$	70	120		V
BV_{ECO}	Emitter-Collector Breakdown Voltage	$I_E = 100\mu\text{A}$, $I_F = 0$	7	10		V
I_{CEO}	Collector-Emitter Dark Current	$V_{CE} = 10\text{V}$, $I_F = 0$		1	50	nA
I_{CBO}	Collector-Base Dark Current	$V_{CB} = 10\text{V}$			20	nA
C_{CE}	Capacitance	$V_{CE} = 0\text{V}$, $f = 1\text{MHz}$		8		pF

Isolation Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.*	Max.	Units
V_{ISO}	Input-Output Isolation Voltage	$f = 60\text{Hz}$, $t = 1\text{sec}$	7500			Vac(pk)
R_{ISO}	Isolation Resistance	$V_{I-O} = 500\text{VDC}$	10^{11}			Ω
C_{ISO}	Isolation Capacitance	$V_{I-O} = \&$, $f = 1\text{MHz}$		0.2	2	pF

*Typical values at $T_A = 25^\circ\text{C}$

Electrical Characteristics (Continued) ($T_A = 25^\circ\text{C}$ unless otherwise specified)

Transfer Characteristics

Symbol	Parameter	Test Conditions	Device	Min.	Typ.*	Max.	Unit
DC CHARACTERISTICS							
CTR	Current Transfer Ratio, Collector to Emitter	$I_F = 10\text{mA}$, $V_{CE} = 10\text{V}$	4N35M, 4N36M, 4N37M	100			%
			H11A1M	50			
			H11A5M	30			
			4N25M, 4N26M H11A2M, H11A3M	20			
			4N27M, 4N28M H11A4M	10			
		$I_F = 10\text{mA}$, $V_{CE} = 10\text{V}$, $T_A = -55^\circ\text{C}$	4N35M, 4N36M, 4N37M	40			
		$I_F = 10\text{mA}$, $V_{CE} = 10\text{V}$, $T_A = +100^\circ\text{C}$	4N35M, 4N36M, 4N37M	40			
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	$I_C = 2\text{mA}$, $I_F = 50\text{mA}$	4N25M, 4N26M, 4N27M, 4N28M,			0.5	V
		$I_C = 0.5\text{mA}$, $I_F = 10\text{mA}$	4N35M, 4N36M, 4N37M			0.3	
			H11A1M, H11A2M, H11A3M, H11A4M, H11A5M			0.4	
AC CHARACTERISTICS							
T_{ON}	Non-Saturated Turn-on Time	$I_F = 10\text{mA}$, $V_{CC} = 10\text{V}$, $R_L = 100\Omega$ (Fig. 11)	4N25M, 4N26M, 4N27M, 4N28M, H11A1M, H11A2M, H11A3M, H11A4, H11A5M		2		μs
		$I_C = 2\text{mA}$, $V_{CC} = 10\text{V}$, $R_L = 100\Omega$ (Fig. 11)	4N35M, 4N36M, 4N37M		2	10	μs
T_{OFF}	Turn-off Time	$I_F = 10\text{mA}$, $V_{CC} = 10\text{V}$, $R_L = 100\Omega$ (Fig. 11)	4N25M, 4N26M, 4N27M, 4N28M, H11A1M, H11A2M, H11A3M, H11A4M, H11A5M		2		μs
		$I_C = 2\text{mA}$, $V_{CC} = 10\text{V}$, $R_L = 100\Omega$ (Fig. 11)	4N35M, 4N36M, 4N37M		2	10	

* Typical values at $T_A = 25^\circ\text{C}$

Typical Performance Curves

Fig. 1 LED Forward Voltage vs. Forward Current

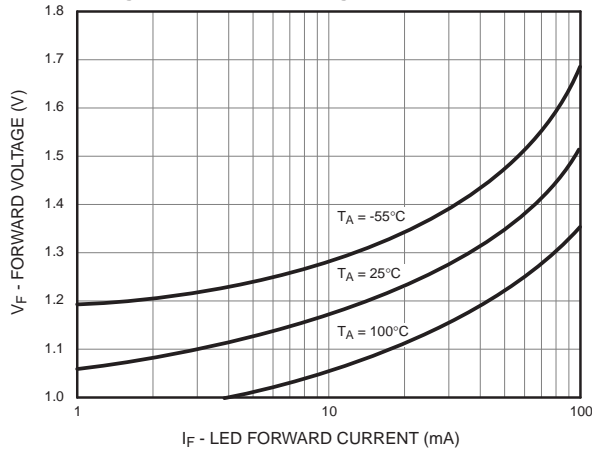


Fig.2 Normalized CTR vs. Forward Current

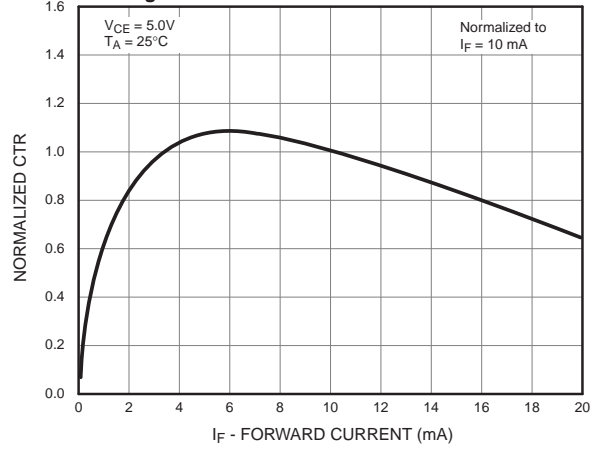


Fig. 3 Normalized CTR vs. Ambient Temperature

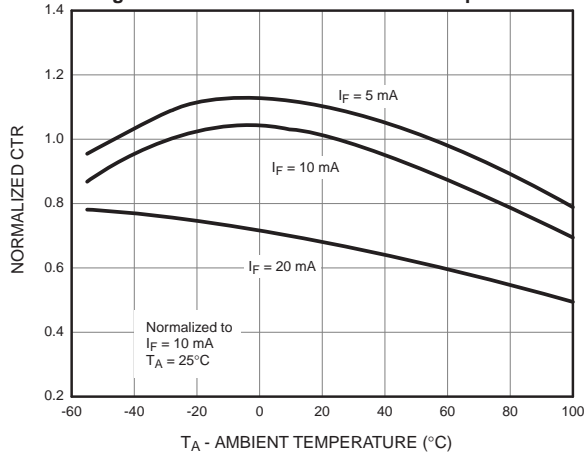


Fig. 4 CTR vs. RBE (Unsaturated)

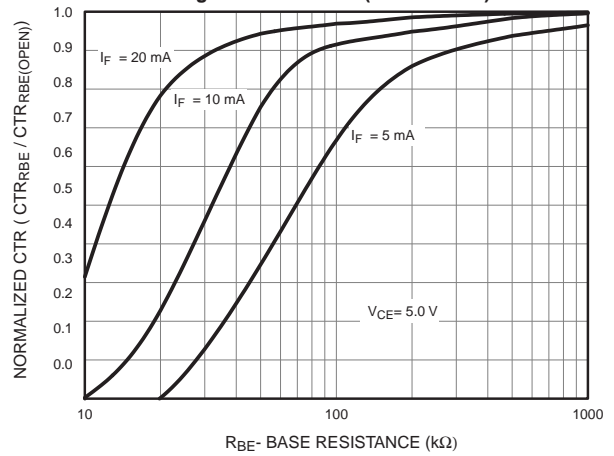


Fig. 5 CTR vs. RBE (Saturated)

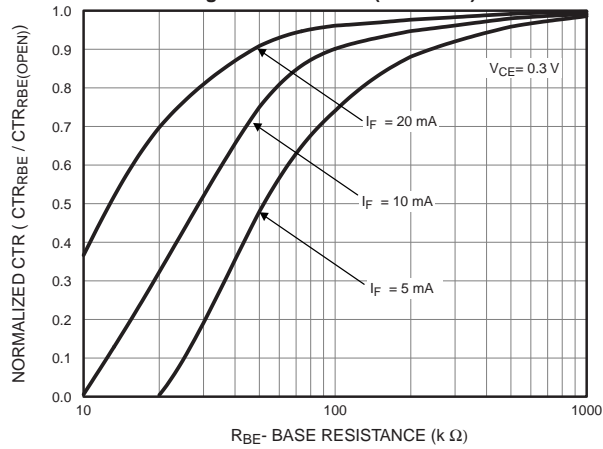
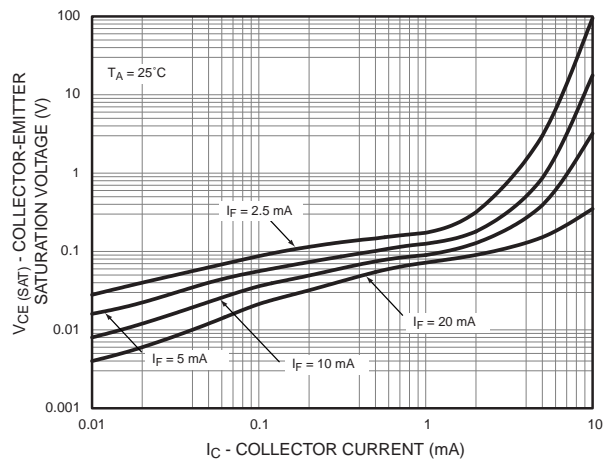


Fig. 6 Collector-Emitter Saturation Voltage vs. Collector Current



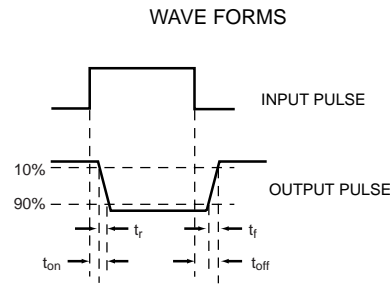
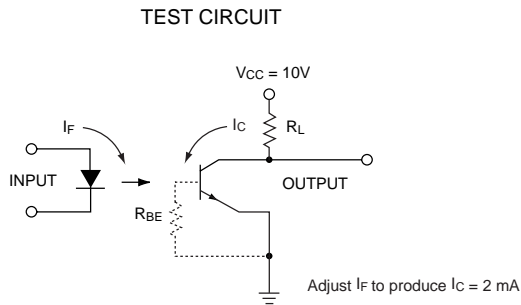
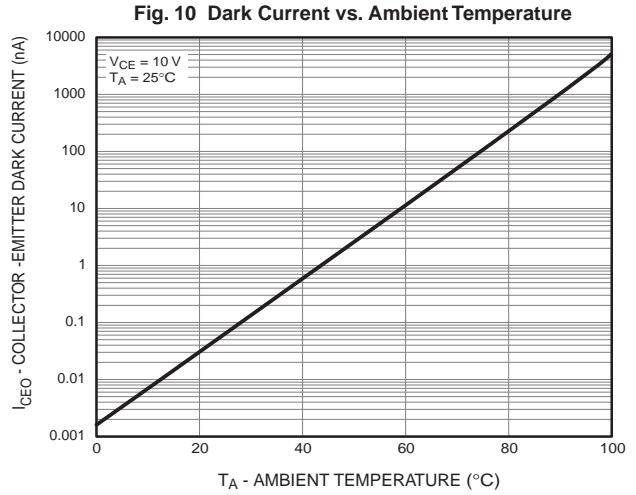
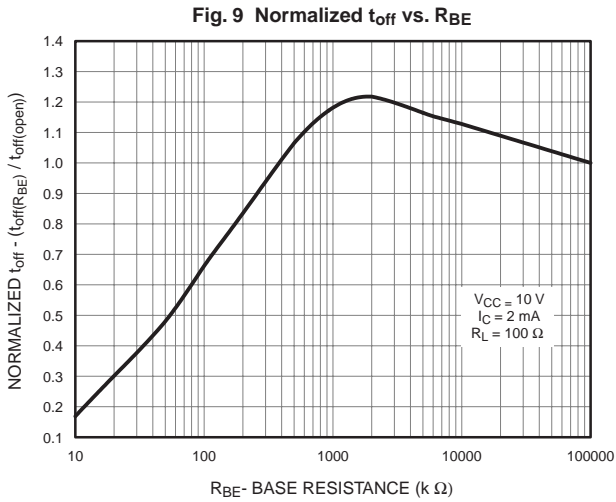
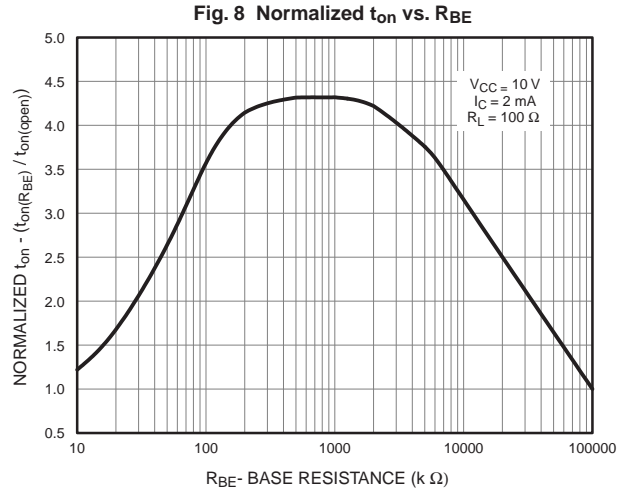
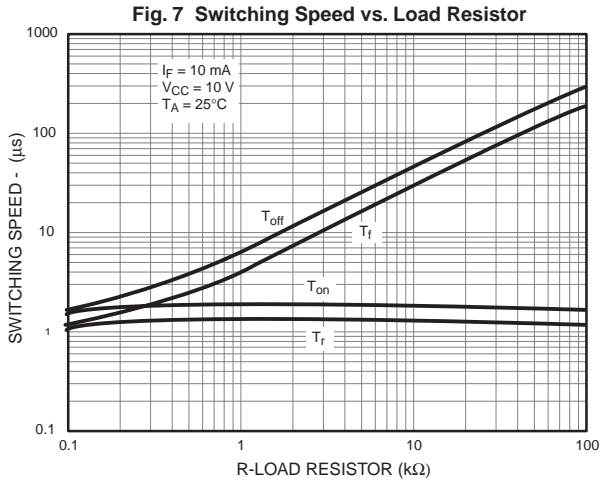
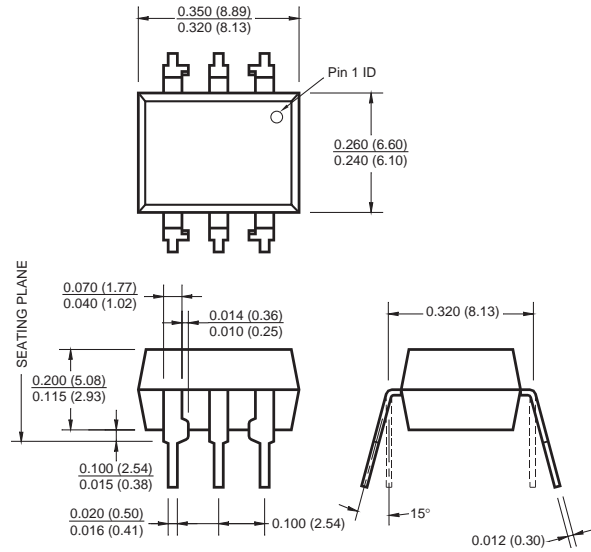


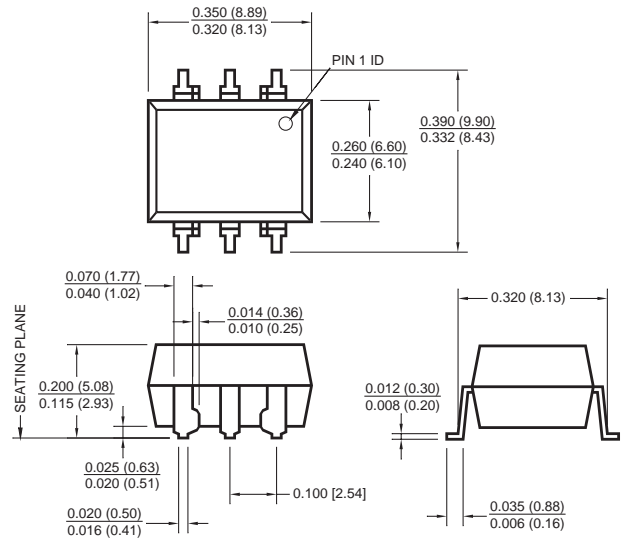
Figure 11. Switching Time Test Circuit and Waveforms

Package Dimensions

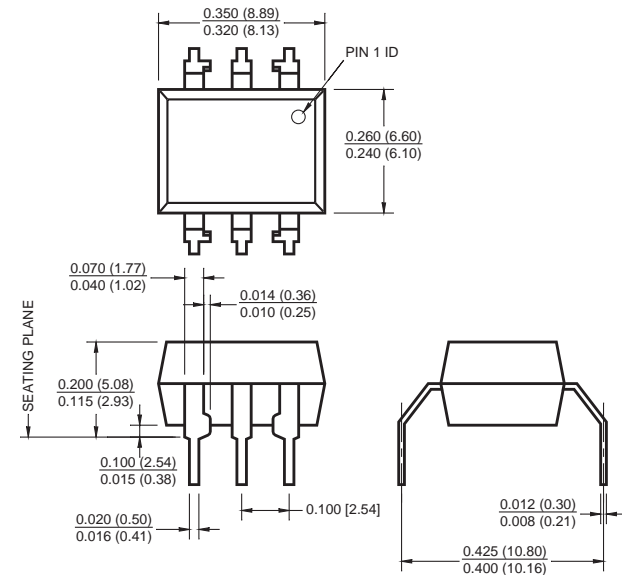
Through Hole



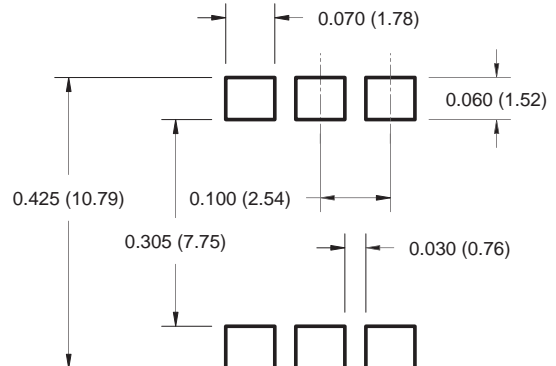
Surface Mount



0.4" Lead Spacing



Recommended Pad Layout for Surface Mount Leadform



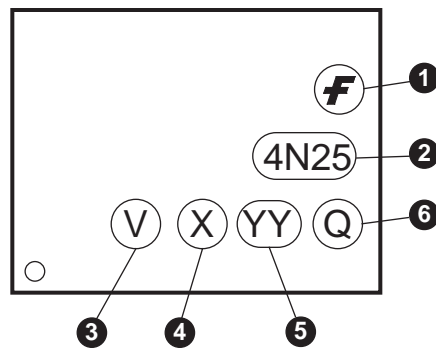
Note:

All dimensions are in inches (millimeters)

Ordering Information

Option	Order Entry Identifier (Example)	Description
No option	4N25M	Standard Through Hole Device
S	4N25SM	Surface Mount Lead Bend
SR2	4N25SR2M	Surface Mount; Tape and Reel
T	4N25TM	0.4" Lead Spacing
V	4N25VM	VDE 0884
TV	4N25TVM	VDE 0884, 0.4" Lead Spacing
SV	4N25SVM	VDE 0884, Surface Mount
SR2V	4N25SR2VM	VDE 0884, Surface Mount, Tape and Reel

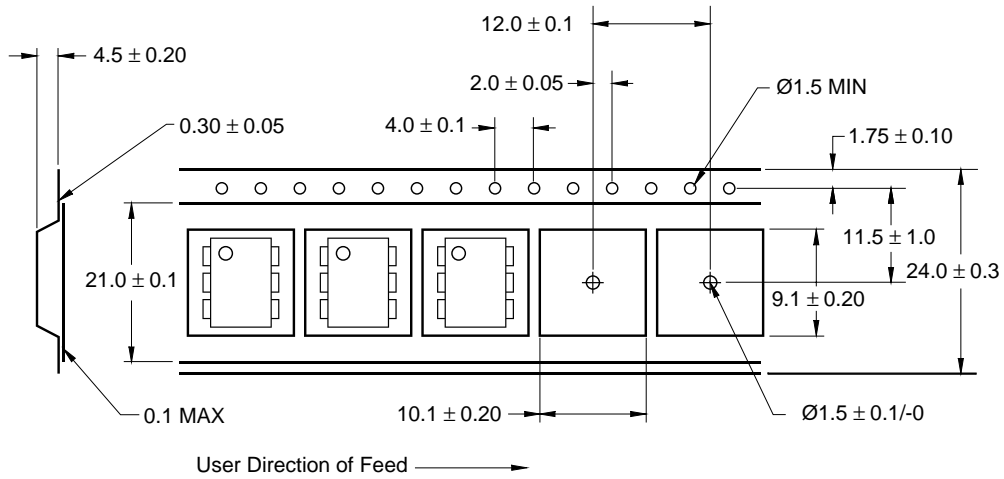
Marking Information



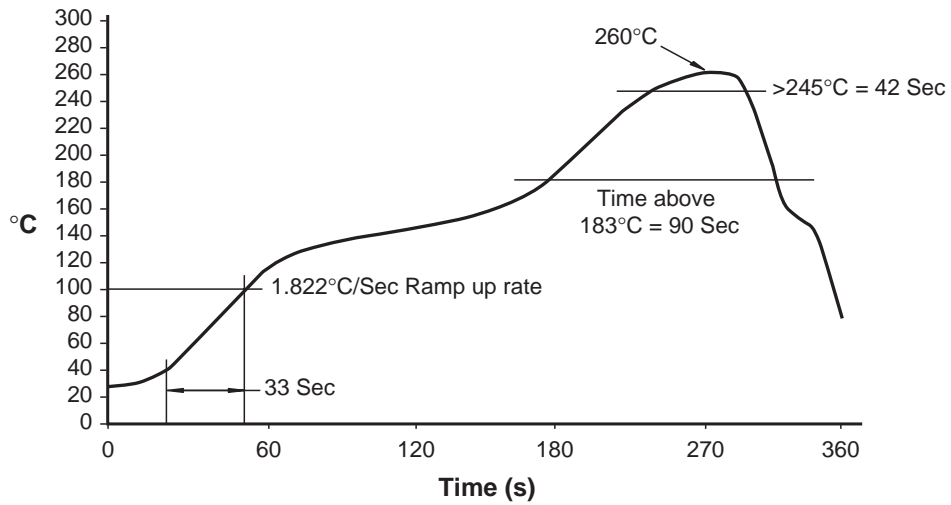
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '7'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

*Note – Parts that do not have the 'V' option (see definition 3 above) that are marked with date code '325' or earlier are marked in portrait format.

Carrier Tape Specification




Reflow Profile





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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only.

Rev. I24

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4N35

6-Pin DIP Package Phototransistor Output Optocoupler

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General description

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Product	Product status	Pb-free Status	Package type	Leads	Packing method
4N35300W	Lifetime Buy		DIP-B	6	BULK

 Indicates product with Pb-free second-level interconnect. For more information [click here](#).

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Safety agency certificates

Certificate	Agency	
E90700, Vol. 1 (936 K)	UL (1577)	Underwriters Laboratories Inc.
E90700, Vol. 1 (936 K)	C-UL	Underwriters Laboratories Inc.
0122085 (677 K)	SEMKO	SEMKO
P01101067 (1638 K)	NEMKO	NEMKO
FI 16812 (964 K)	FIMKO	FIMKO
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1027742 (2305 K)	CSA	Canadian Standards Association
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Qualification Support

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Product
4N35300W

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