

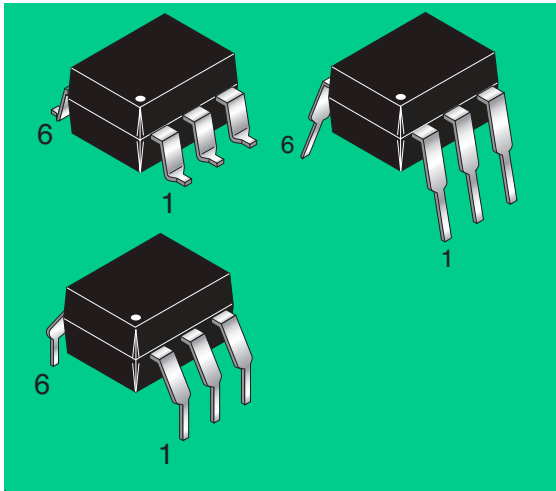
# 6-PIN DIP OPTOCOUPLERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

**MOC8111**

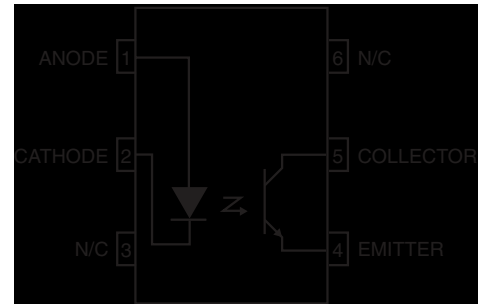
**MOC8112**

**MOC8113**

## PACKAGE



## SCHEMATIC



## DESCRIPTION

The MOC811X series consists of a Gallium Arsenide IRED coupled with an NPN phototransistor. The base of the transistor is not bonded to an external pin for improved noise immunity.

## FEATURES

- High isolation voltage  
5300 VAC RMS—1 minute
- High  $BV_{CEO}$  minimum 70 Volts
- Current transfer ratio in selected groups:  
MOC8111: 20% min.  
MOC8112: 50% min.  
MOC8113: 100% min.
- Maximum switching time in saturation specified
- Underwriters Laboratory (UL) recognized (File #E90700)
- VDE recognized (File #94766)

## APPLICATIONS

- Power Supply Regulators
- Digital Logic Inputs
- Microprocessor Inputs
- Appliance Sensor Systems
- Industrial Controls

# 6-PIN DIP OPTOCOUPPLERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

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**ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified)

Parameter	Symbol	Value	Unit
<b>INPUT LED</b>			
Forward Current – Continuous	$I_F$	90	mA
Forward Current – Peak (PW = 1 $\mu$ s, 300pps)	$I_F(\text{pk})$	3	A
Reverse Voltage	$V_R$	6	Volts
LED Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	135	mW
Derate above 25 $^\circ\text{C}$		1.8	mW/ $^\circ\text{C}$
<b>OUTPUT TRANSISTOR</b>			
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	200	mW
Derate above 25 $^\circ\text{C}$		2.67	mW/ $^\circ\text{C}$
<b>TOTAL DEVICE</b>			
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	260	mW
Derate above 25 $^\circ\text{C}$		3.5	mW/ $^\circ\text{C}$
Ambient Operating Temperature Range	$T_{\text{OPR}}$	-55 to +100	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{STG}}$	-55 to +150	$^\circ\text{C}$
Lead Soldering Temperature (1/16" from case, 10 sec. duration)	$T_{\text{SOL}}$	260	$^\circ\text{C}$

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**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified)

**INDIVIDUAL COMPONENT CHARACTERISTICS**

Parameter	Test Conditions	Symbol	Device	Min	Typ	Max	Unit
<b>EMITTER</b>							
Input Forward Voltage	$I_F = 60 \text{ mA}$	$V_F$	All		1.35	1.65	V
	$I_F = 10 \text{ mA}$				1.15	1.50	
Reverse Voltage	$I_R = 10 \mu\text{A}$	$V_R$	All	6.0	15		V
Capacitance	$V_F = 0 \text{ V}, f = 1.0 \text{ MHz}$	$C_J$	All		50		pF
	$V_F = 1 \text{ V}, f = 1.0 \text{ MHz}$				65		
Reverse Leakage Current	$V_R = 3.0 \text{ V}$	$I_R$	All		.35	10	$\mu\text{A}$
<b>DETECTOR</b>							
Breakdown Voltage Collector to Emitter	$I_C = 1.0 \text{ mA}, I_F = 0$	$BV_{CEO}$	All	70			V
Breakdown Voltage Emitter to Collector	$I_E = 100 \mu\text{A}, I_F = 0$	$BV_{ECO}$	All	7			V
Leakage Current Collector to Emitter	$V_{CE} = 10 \text{ V}, I_F = 0$	$I_{CEO}$	All		5	50	V
Capacitance Collector to Emitter	$V_{CE} = 0 \text{ V}, f = 1 \text{ MHz}$	$C_{CE}$	All		8		pF

**ISOLATION CHARACTERISTICS**

Characteristic	Test Conditions	Symbol	Min	Typ	Max	Units
Input-Output Isolation Voltage	$f = 60 \text{ Hz}, t = 1 \text{ min.}$	$V_{ISO}$	5300			$V_{RMS}$
Isolation Resistance	$V_{I-O} = 500 \text{ VDC}$	$R_{ISO}$	$10^{11}$			$\Omega$
Isolation Capacitance	$V_{I-O} = 0, f = 1 \text{ MHz}$	$C_{ISO}$		0.5		pF

# 6-PIN DIP OPTOCOUPPLERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

## MOC8111

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### TRANSFER CHARACTERISTICS (T<sub>A</sub> = 25°C Unless otherwise specified)

DC CHARACTERISTICS	Test Conditions	Symbol	Device	Min	Typ	Max	Units
Output/Input Current Transfer Ratio	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5V	CTR	MOC8111	20			%
			MOC8112	50			
			MOC8113	100			
Collector-Emitter Saturation Voltage	I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2.5 mA	V <sub>CE(SAT)</sub>	All		0.27	0.4	V
AC CHARACTERISTICSØ	Test Conditions	Symbol	Device	Min	Typ	Max	Units
<b>Non-Saturated Switching Times</b>							
Turn-On Time	R <sub>L</sub> = 100 Ω, I <sub>C</sub> = 2 mA, V <sub>CC</sub> = 10 V See Figure 7	t <sub>on</sub>	All		6.0	10	µS
Turn-Off Time		t <sub>off</sub>	All		5.5	10	µS
<b>Saturated Switching Times</b>							
Turn-On Time	I <sub>F</sub> = 20 mA, V <sub>CE</sub> = 0.4 V	t <sub>on</sub>	MOC8111		3.0	5.5	µS
	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 0.4 V		MOC812, MOC8113		4.2	8.0	
Rise-Time	I <sub>F</sub> = 20 mA, V <sub>CE</sub> = 0.4 V	t <sub>r</sub>	MOC8111		2.0	4.0	µS
	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 0.4 V		MOC812, MOC8113		3.0	6.0	
Turn-Off Time	I <sub>F</sub> = 20 mA, V <sub>CE</sub> = 0.4 V	t <sub>off</sub>	MOC8111		18	34	µS
	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 0.4 V		MOC812, MOC8113		23	39	
Fall-Time	I <sub>F</sub> = 20 mA, V <sub>CE</sub> = 0.4 V	t <sub>f</sub>	MOC8111		11	20	µS
	I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 0.4 V		MOC812, MOC8113		14	24	

# 6-PIN DIP OPTOCOUPPLERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

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## TYPICAL PERFORMANCE CURVES

Fig. 1 LED Forward Voltage vs. Forward Current

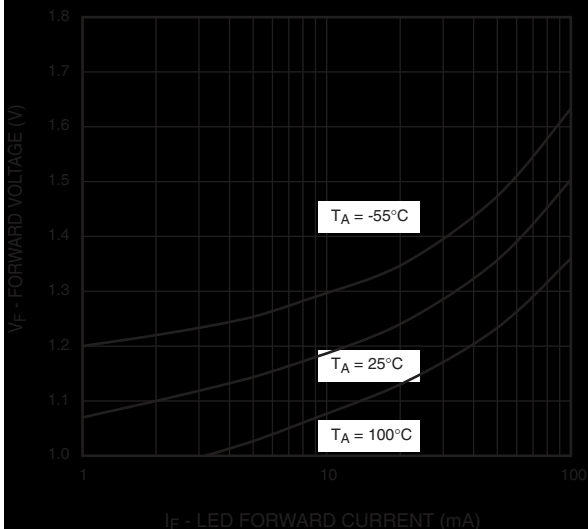


Fig. 2 Normalized CTR vs. Forward Current

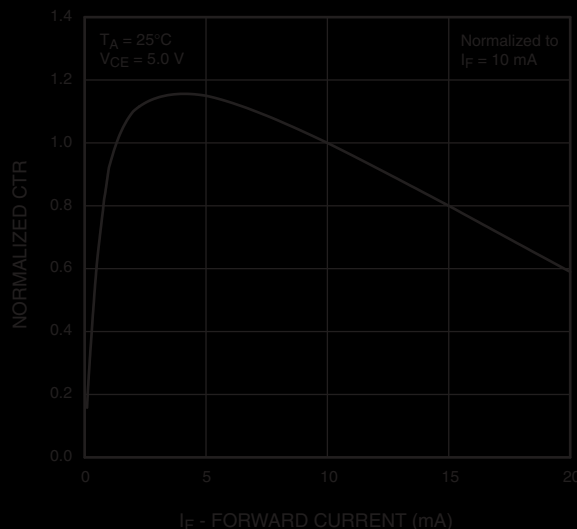


Fig. 3 Normalized CTR vs. Ambient Temperature

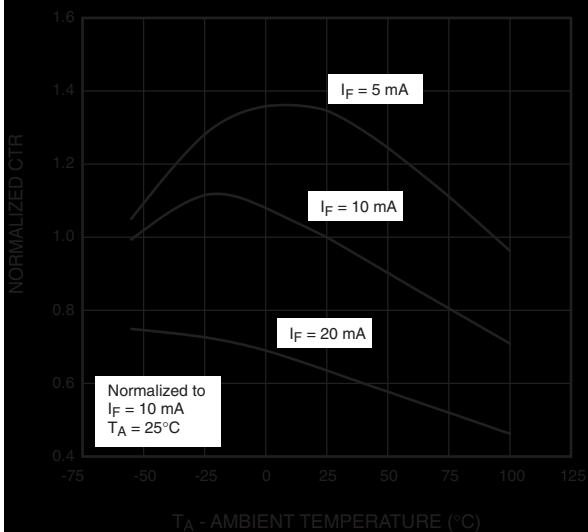
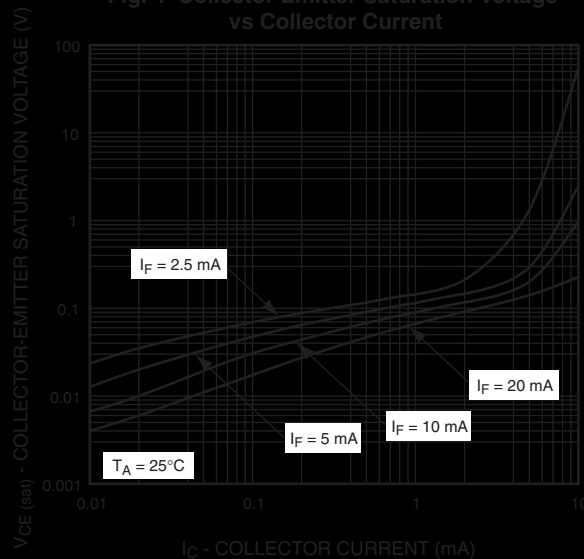


Fig. 4 Collector Emitter Saturation Voltage vs. Collector Current



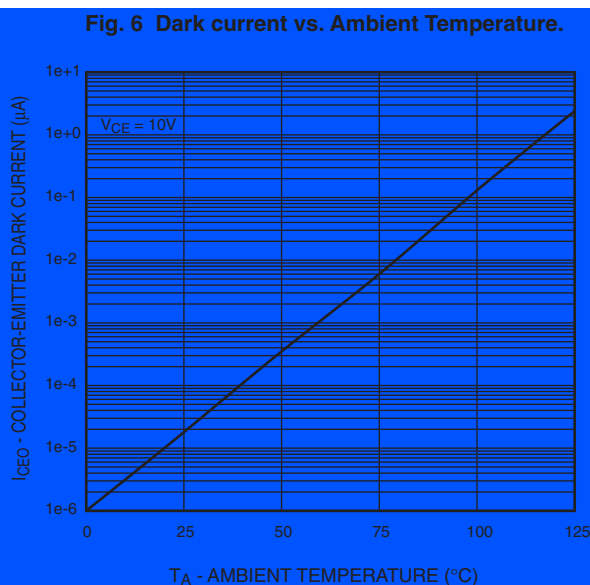
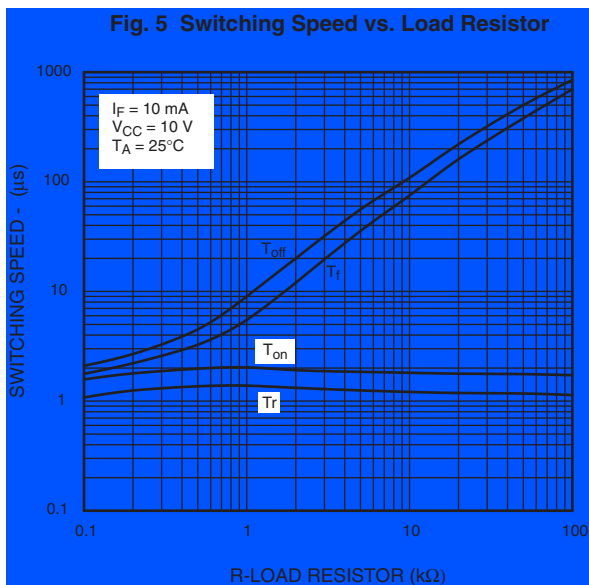
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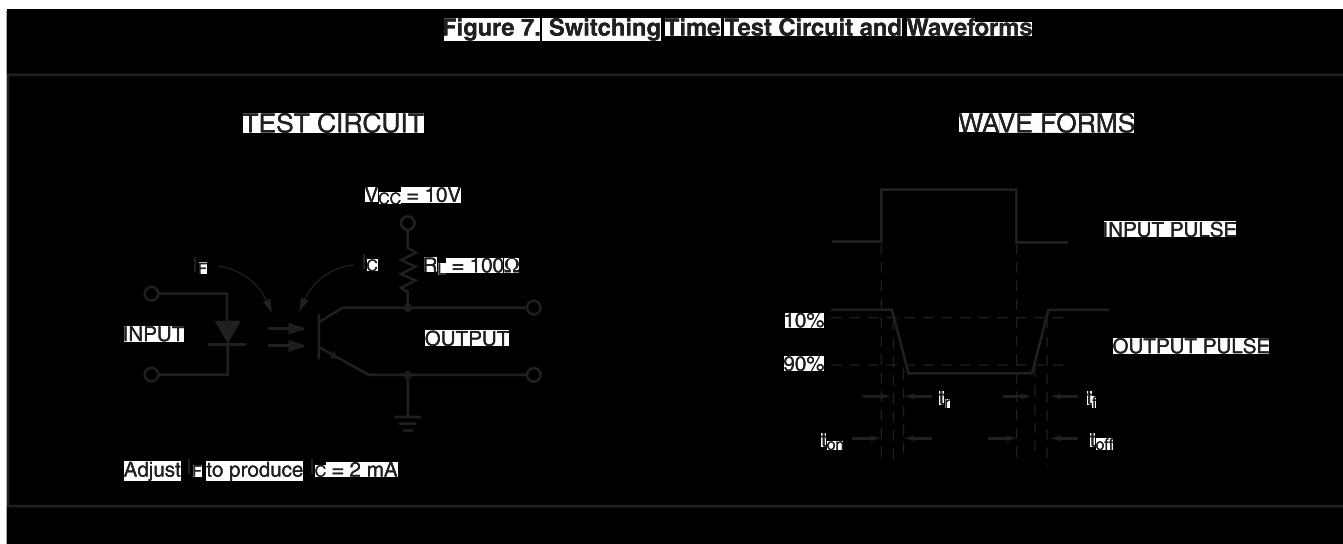
MOC8112

MOC8113

## TYPICAL PERFORMANCE CURVES (continued)



**Figure 7. Switching Time Test Circuit and Waveforms**



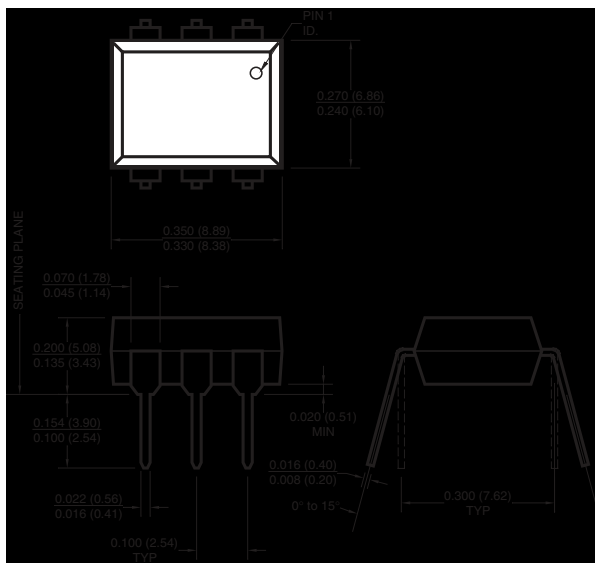
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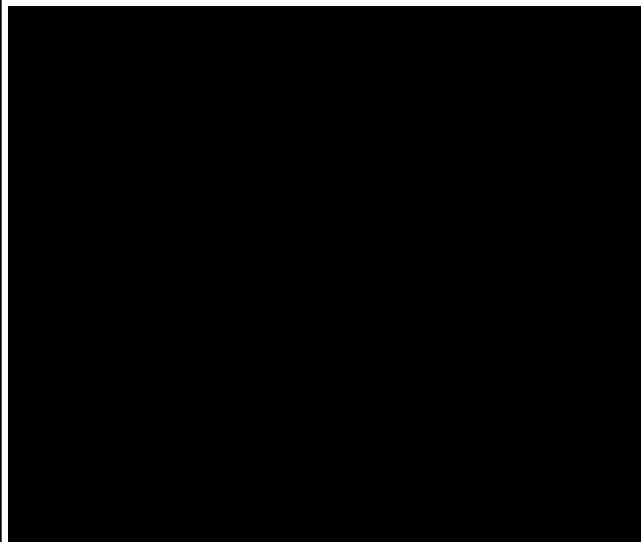
**MOC8112**

**MOC8113**

## Package Dimensions (Through Hole)



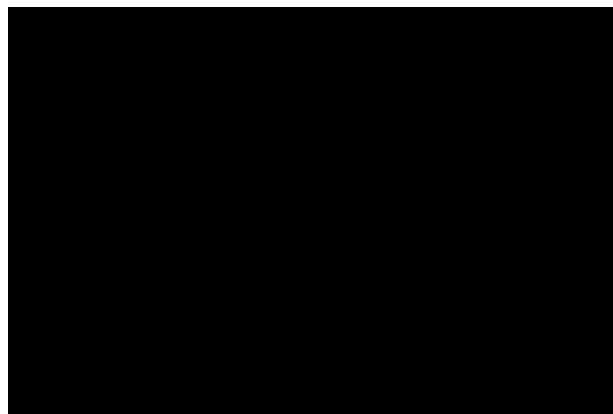
## Package Dimensions (Surface Mount)



## Package Dimensions (0.4" Lead Spacing)



## Recommended Pad Layout for Surface Mount Leadform



**NOTE**

All dimensions are in inches (millimeters)

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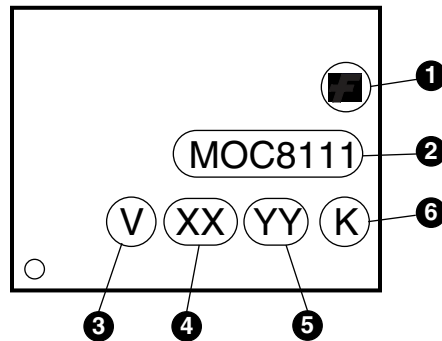
**MOC8112**

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## ORDERING INFORMATION

Option	Example Part Number	Description
No Suffix	MOC8111	Through Hole
S	MOC8111S	Surface Mount Lead Bend
SD	MOC8111SD	Surface Mount; Tape and Reel
W	MOC8111W	0.4" Lead Spacing
300	MOC8111300	VDE 0884
300W	MOC8111300W	VDE 0884, 0.4" Lead Spacing
3S	MOC81113S	VDE 0884, Surface Mount
3SD	MOC81113SD	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	Two digit year code, e.g., '03'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code



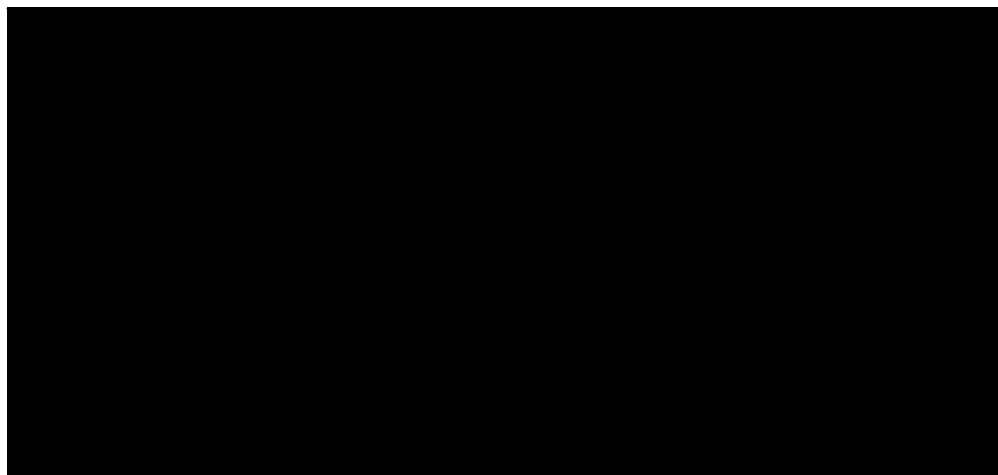
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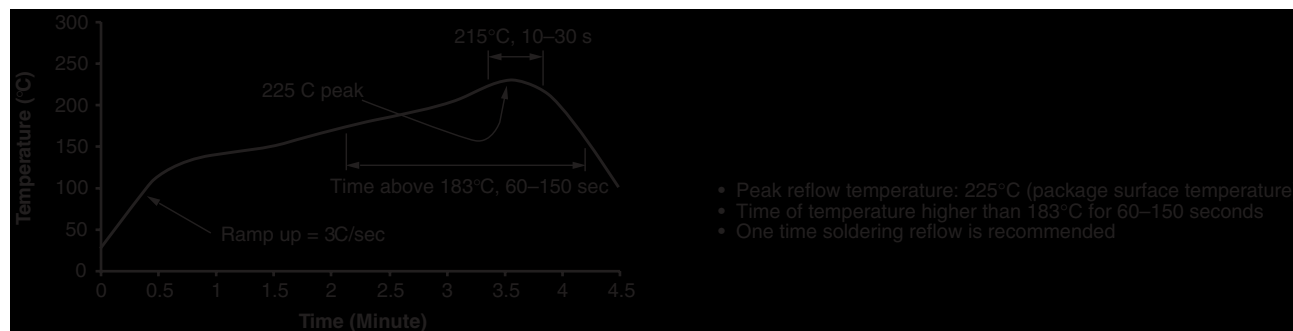
## Carrier Tape Specifications



### NOTE

All dimensions are in inches (millimeters)

## Reflow Profile (Black Package, No Suffix)





# 6-PIN DIP OPTOCOUPPLERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

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**MOC8111****MOC8112****MOC8113**

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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.