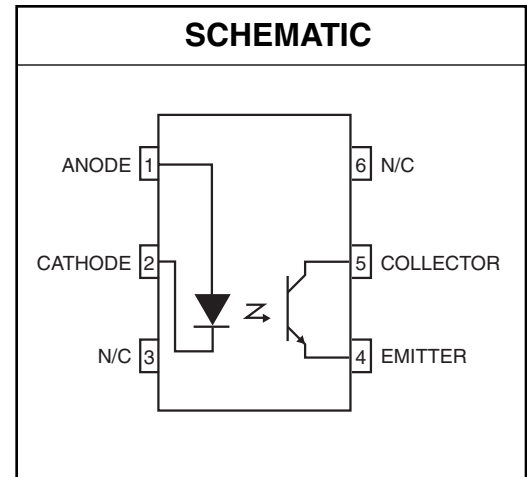
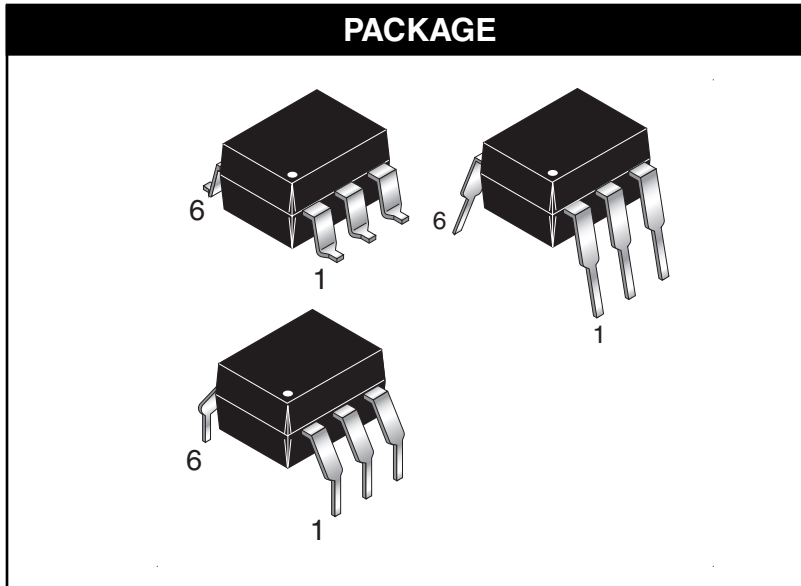


**MOC8111**

**MOC8112**

**MOC8113**



**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

**MOC8111**

**MOC8112**

**MOC8113**

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified)			
<b>Parameter</b>	<b>Symbol</b>	<b>Value</b>	<b>Unit</b>
<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	$^\circ\text{C}$

**MOC8111**

**MOC8112**

**MOC8113**

**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

**MOC8111**

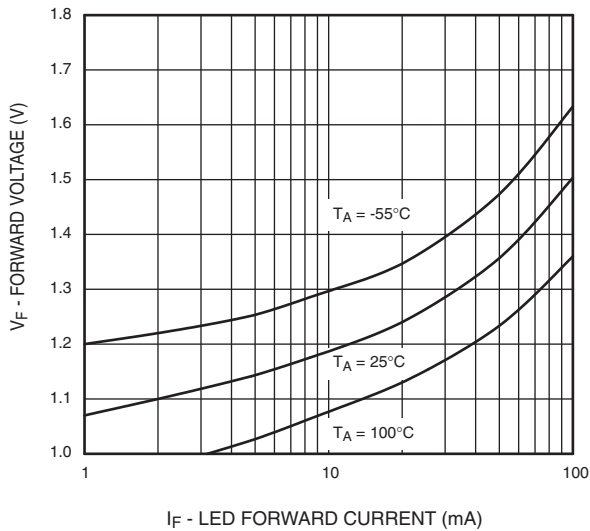
**MOC8112**

**MOC8113**

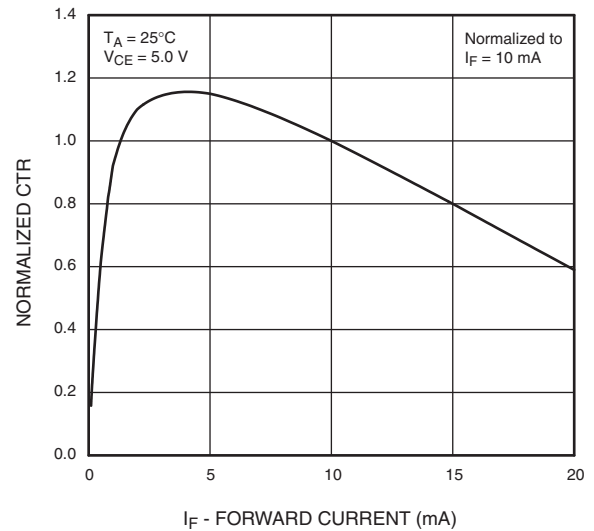
<b>TRANSFER CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified)							
<b>DC CHARACTERISTICS</b>	<b>Test Conditions</b>	<b>Symbol</b>	<b>Device</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>
Output/Input Current Transfer Ratio	$I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$	CTR	MOC8111	20			%
			MOC8112	50			
			MOC8113	100			
Collector-Emitter Saturation Voltage	$I_F = 10\text{ mA}, I_C = 2.5\text{ mA}$	$V_{CE(SAT)}$	All		0.27	0.4	V
<b>AC CHARACTERISTICSØ</b>	<b>Test Conditions</b>	<b>Symbol</b>	<b>Device</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>
<b>Non-Saturated Switching Times</b>							
Turn-On Time	$R_L = 100\ \Omega, I_C = 2\text{ mA}, V_{CC} = 10\text{ V}$ See Figure 7	$t_{on}$	All		6.0	10	$\mu\text{S}$
Turn-Off Time		$t_{off}$	All		5.5	10	$\mu\text{S}$
<b>Saturated Switching Times</b>							
Turn-On Time	$I_F = 20\text{ mA}, V_{CE} = 0.4\text{ V}$	$t_{on}$	MOC8111		3.0	5.5	$\mu\text{S}$
	$I_F = 10\text{ mA}, V_{CE} = 0.4\text{ V}$		MOC812, MOC8113		4.2	8.0	
Rise-Time	$I_F = 20\text{ mA}, V_{CE} = 0.4\text{ V}$	$t_r$	MOC8111		2.0	4.0	$\mu\text{S}$
	$I_F = 10\text{ mA}, V_{CE} = 0.4\text{ V}$		MOC812, MOC8113		3.0	6.0	
Turn-Off Time	$I_F = 20\text{ mA}, V_{CE} = 0.4\text{ V}$	$t_{off}$	MOC8111		18	34	$\mu\text{S}$
	$I_F = 10\text{ mA}, V_{CE} = 0.4\text{ V}$		MOC812, MOC8113		23	39	
Fall-Time	$I_F = 20\text{ mA}, V_{CE} = 0.4\text{ V}$	$t_f$	MOC8111		11	20	$\mu\text{S}$
	$I_F = 10\text{ mA}, V_{CE} = 0.4\text{ V}$		MOC812, MOC8113		14	24	

**TYPICAL PERFORMANCE CURVES**

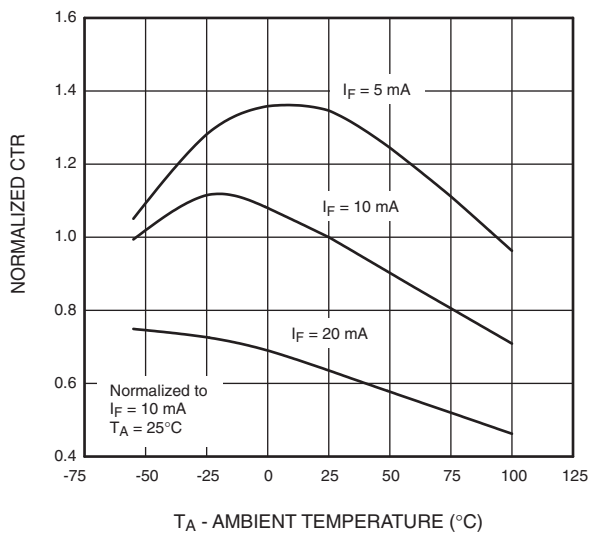
**Fig. 1 LED Forward Voltage vs. Forward Current**



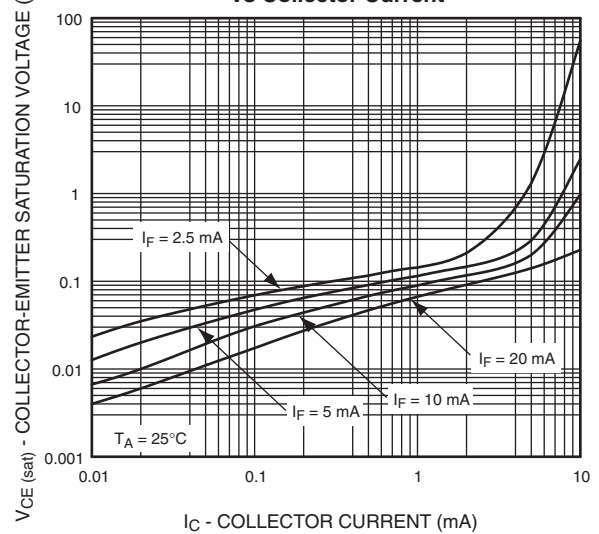
**Fig. 2 Normalized CTR vs. Forward Current**



**Fig. 3 Normalized CTR vs. Ambient Temperature**

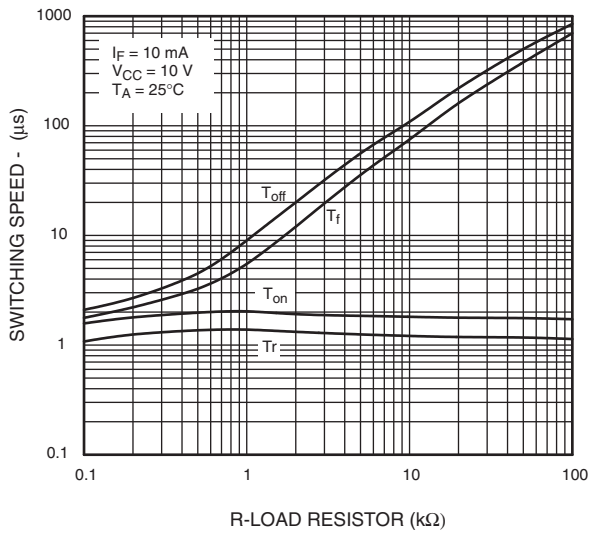


**Fig. 4 Collector Emitter Saturation Voltage vs Collector Current**

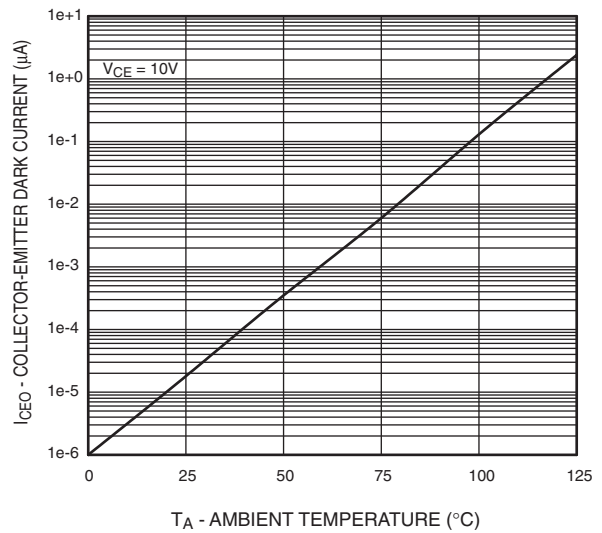


**TYPICAL PERFORMANCE CURVES (continued)**

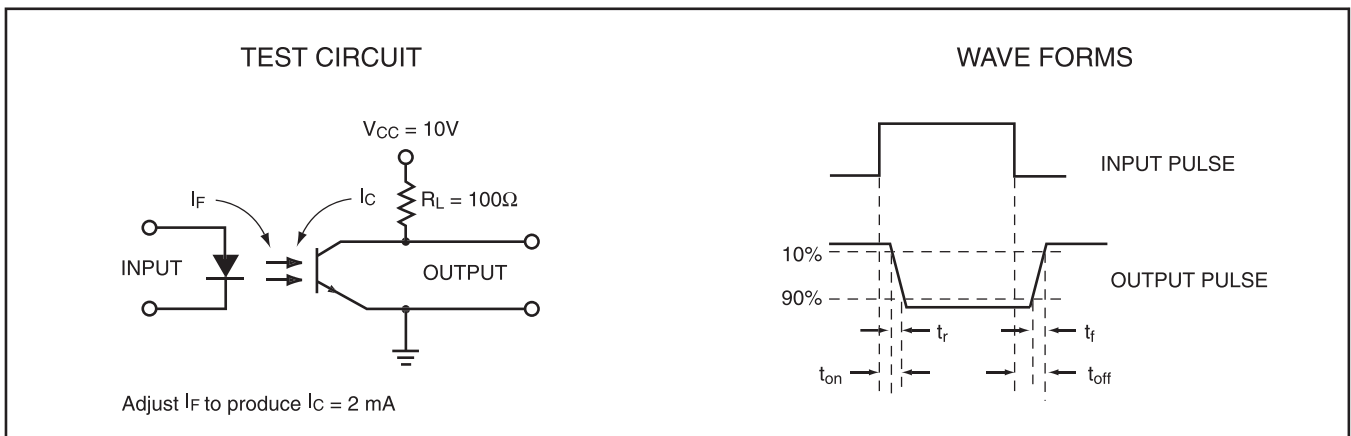
**Fig. 5 Switching Speed vs. Load Resistor**



**Fig. 6 Dark current vs. Ambient Temperature.**



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

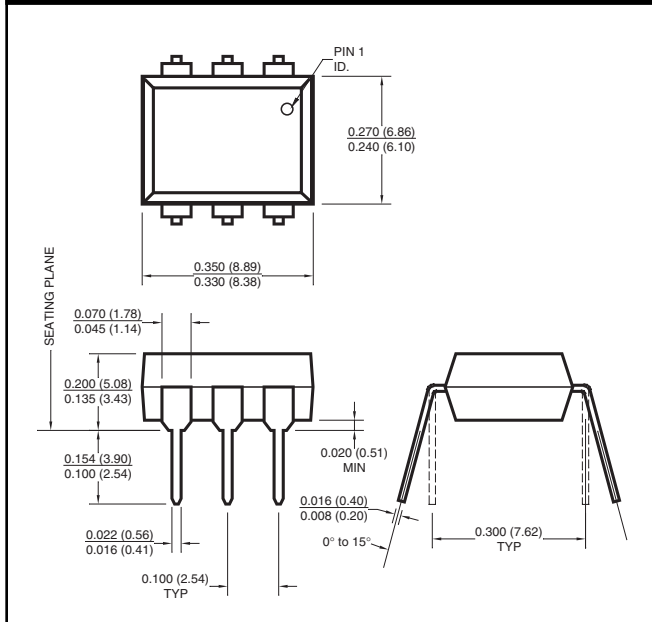


**MOC8111**

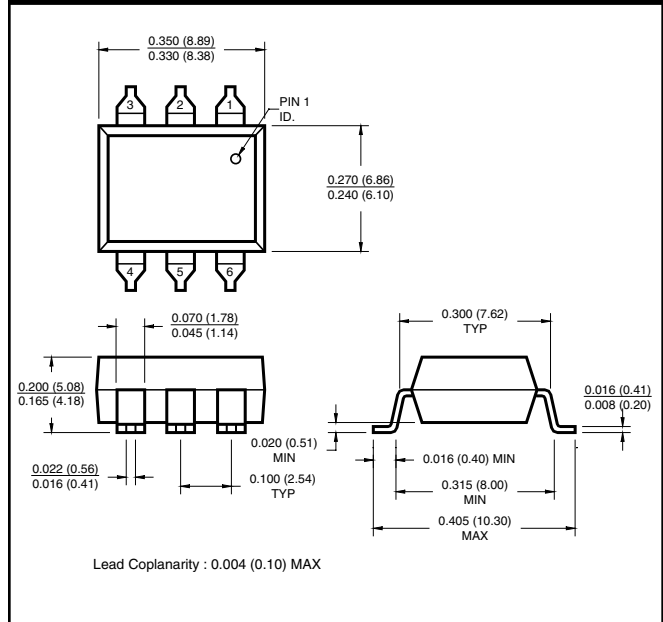
**MOC8112**

**MOC8113**

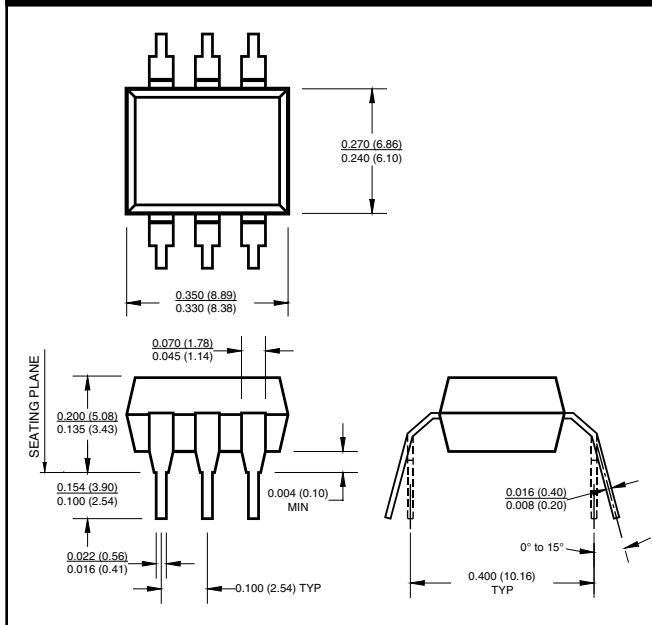
**Package Dimensions (Through Hole)**



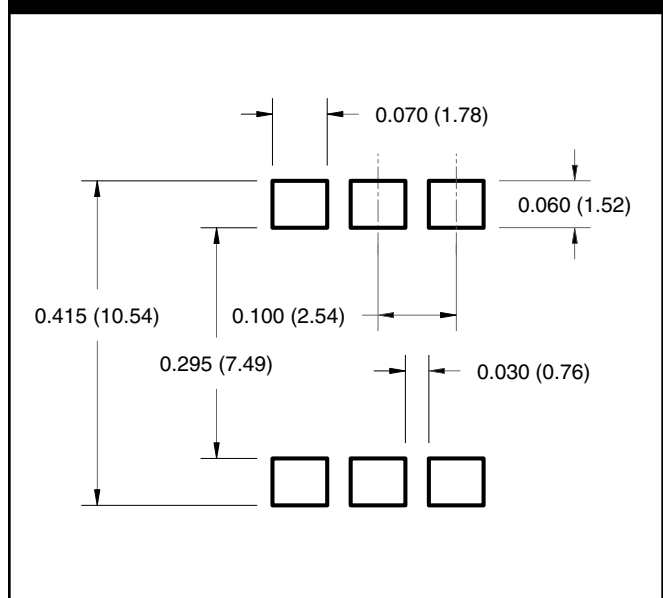
**Package Dimensions (Surface Mount)**



**Package Dimensions (0.4" Lead Spacing)**



**Recommended Pad Layout for  
Surface Mount Leadform**



**NOTE**

All dimensions are in inches (millimeters)

**MOC8111**

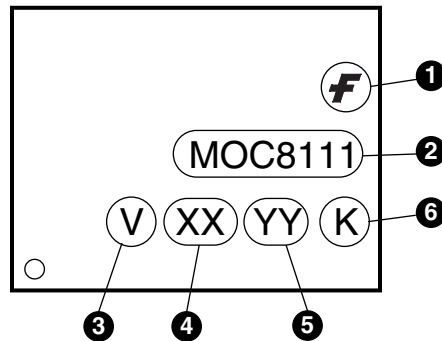
**MOC8112**

**MOC8113**

**ORDERING INFORMATION1**

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

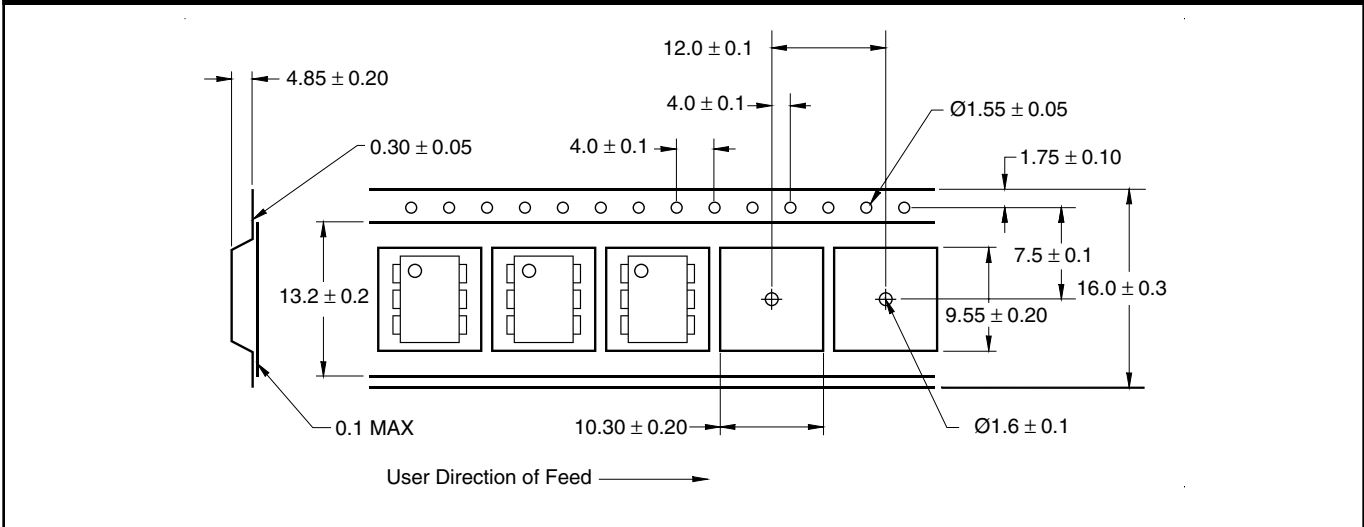


**MOC8111**

**MOC8112**

**MOC8113**

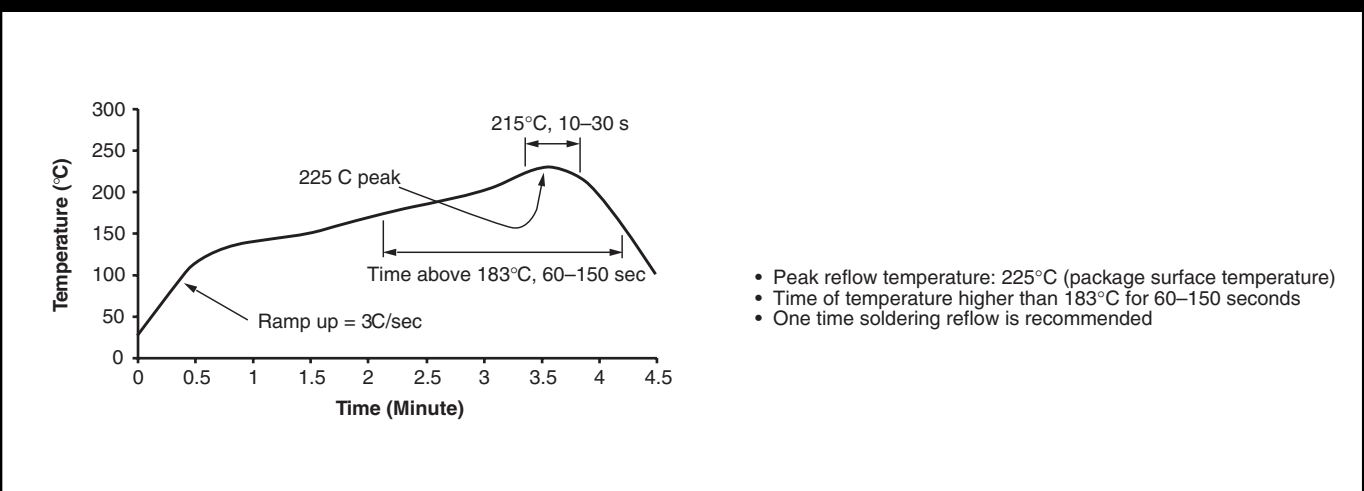
**Carrier Tape Specifications**



**NOTE**

All dimensions are in inches (millimeters)

**Reflow Profile (Black Package, No Suffix)**



---

**MOC8111**

**MOC8112**

**MOC8113**

---

**DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
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.