



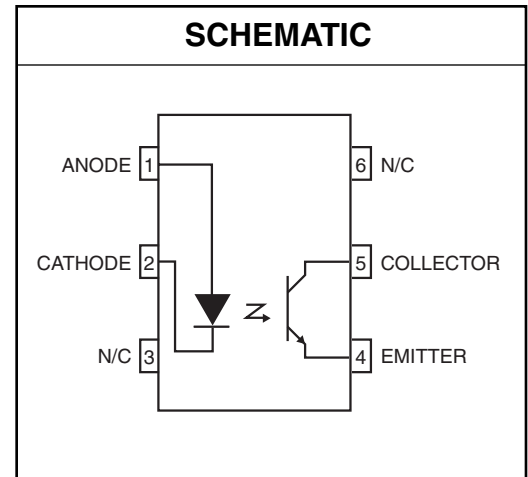
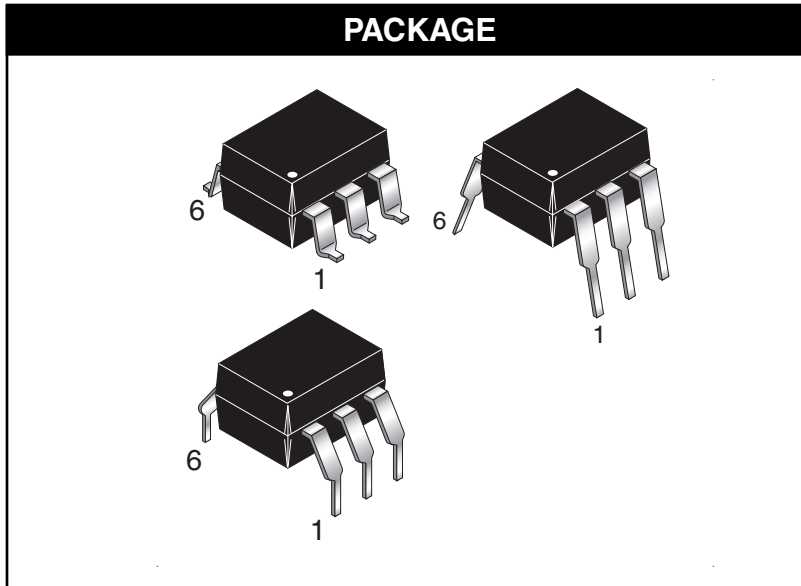
**THE DATASHEET OF  
MOC8111SD**



**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 @ $T_A = 25^\circ\text{C}$ Derate above 25 $^\circ\text{C}$	$P_D$	135	mW
		1.8	mW/ $^\circ\text{C}$
<b>OUTPUT TRANSISTOR</b>			
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25 $^\circ\text{C}$	$P_D$	200	mW
		2.67	mW/ $^\circ\text{C}$
<b>TOTAL DEVICE</b>			
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25 $^\circ\text{C}$	$P_D$	260	mW
		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**

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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

**MOC8111**

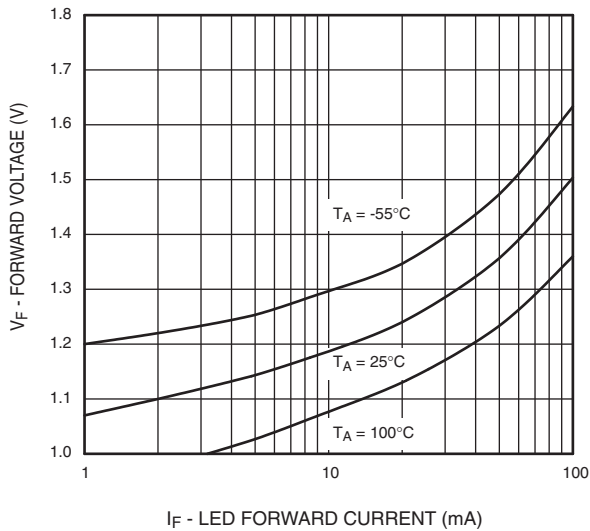
**MOC8112**

**MOC8113**

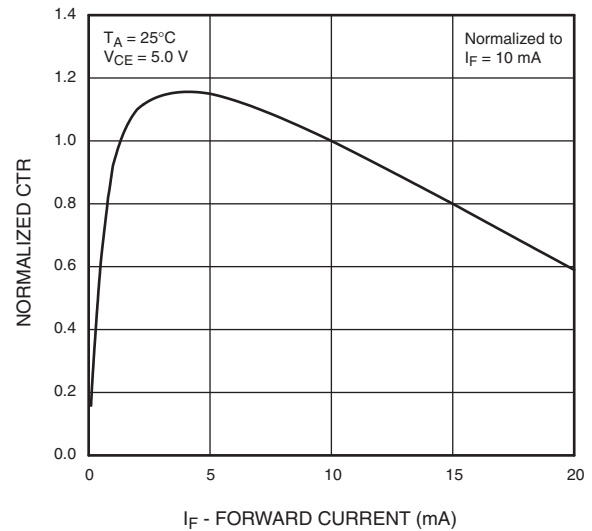
<b>TRANSFER CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified)							
<b>DC CHARACTERISTICS</b>	<b>Test Conditions</b>	<b>Symbol</b>	<b>Device</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>
Output/Input Current Transfer Ratio	$I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$	CTR	MOC8111	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 CHARACTERISTICS</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**

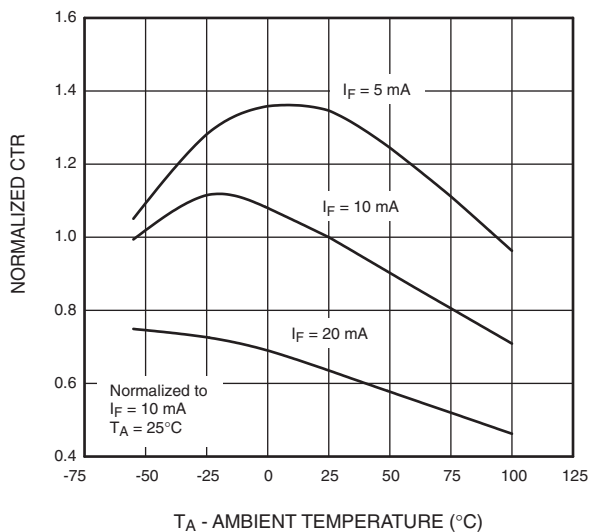
**Fig. 1 LED Forward Voltage vs. Forward Current**



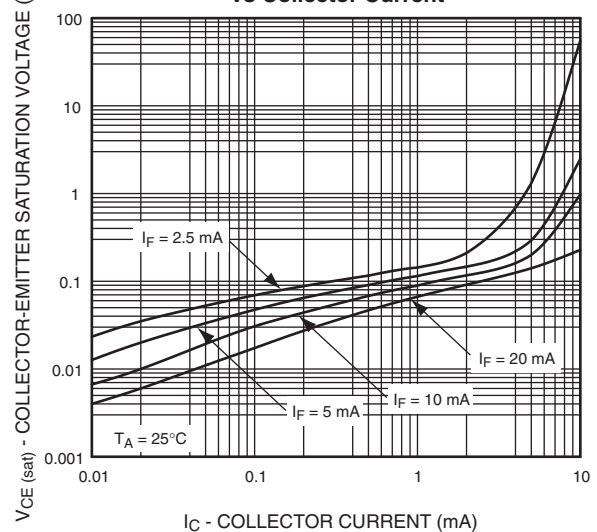
**Fig. 2 Normalized CTR vs. Forward Current**



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



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



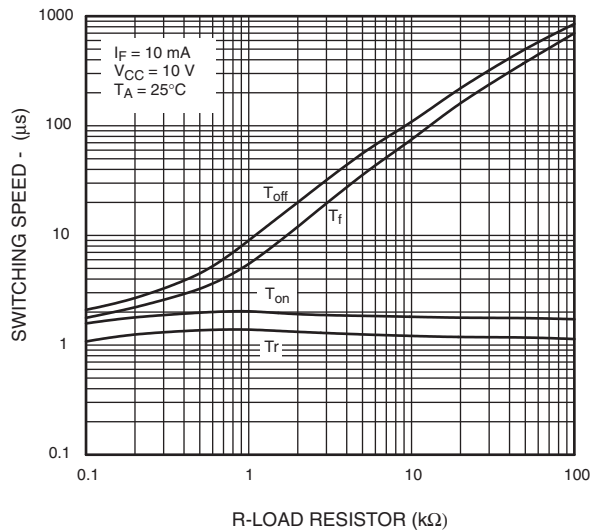
**MOC8111**

**MOC8112**

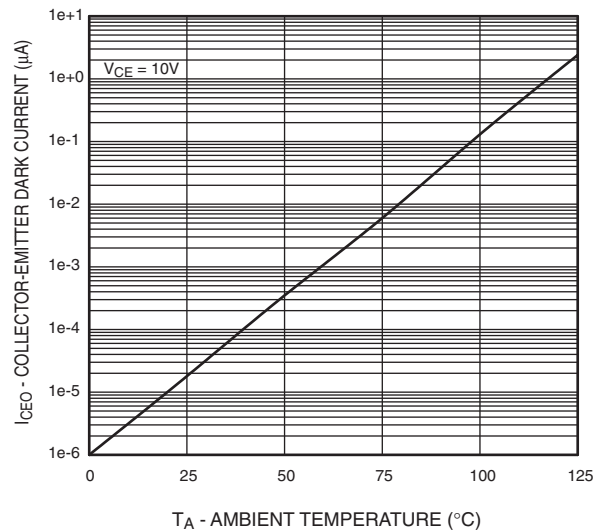
**MOC8113**

**TYPICAL PERFORMANCE CURVES (continued)**

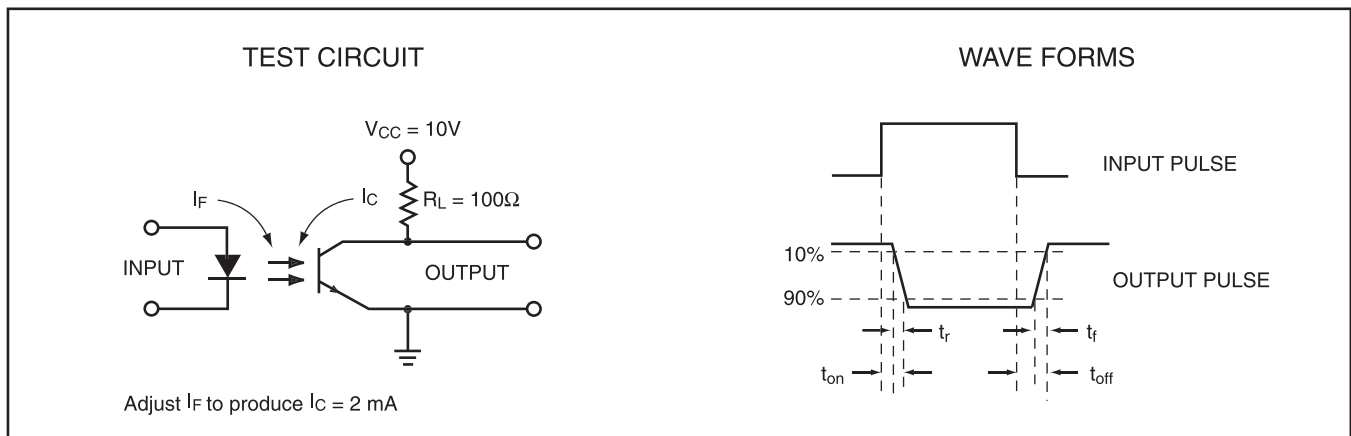
**Fig. 5 Switching Speed vs. Load Resistor**



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



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

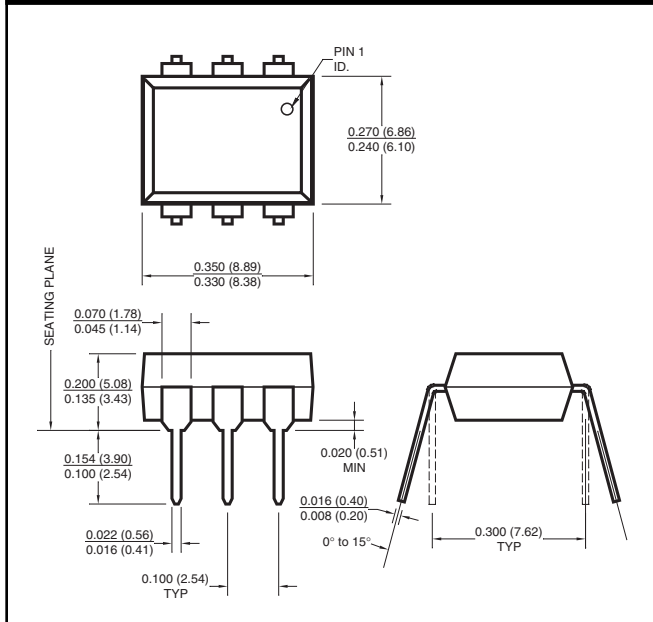


**MOC8111**

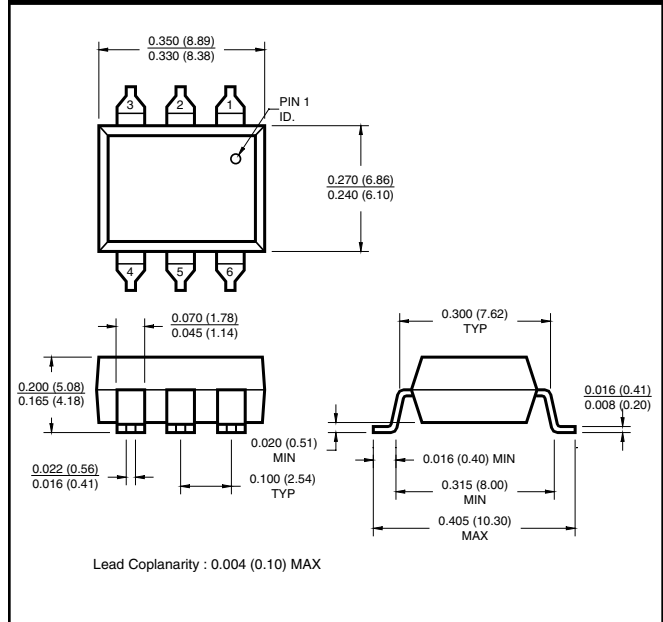
**MOC8112**

**MOC8113**

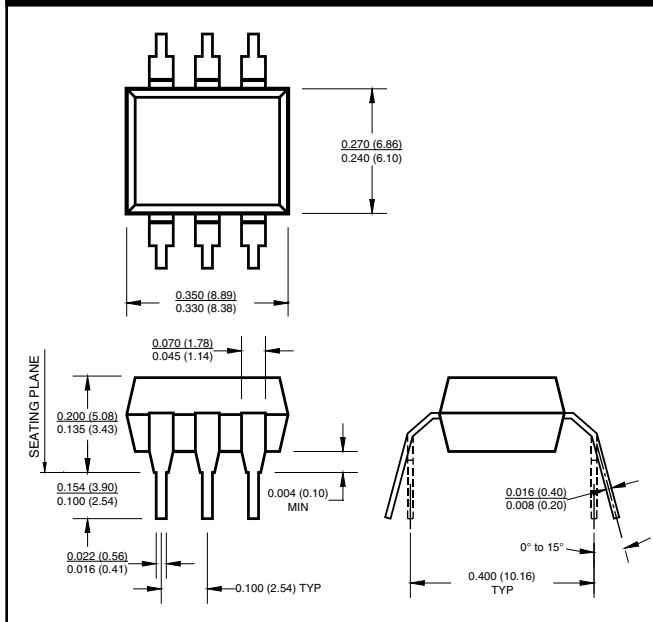
**Package Dimensions (Through Hole)**



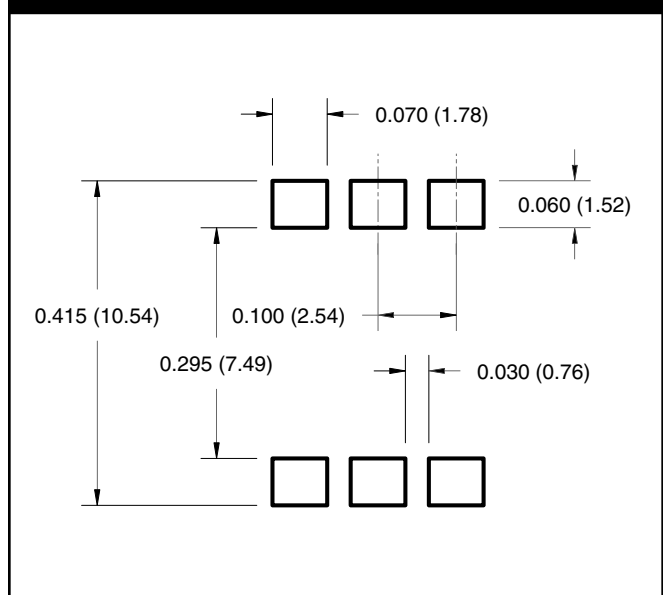
**Package Dimensions (Surface Mount)**



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



**Recommended Pad Layout for  
Surface Mount Leadform**



**NOTE**  
All dimensions are in inches (millimeters)

**MOC8111**

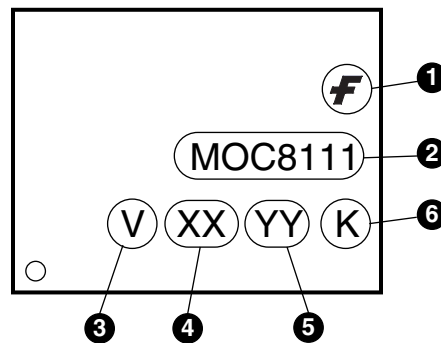
**MOC8112**

**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**



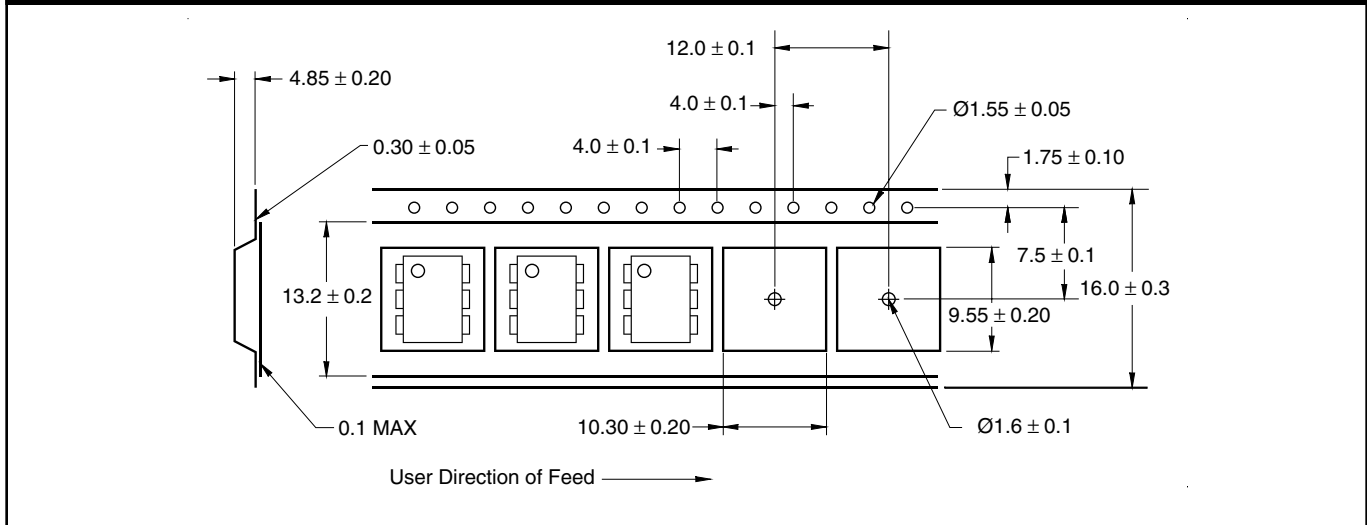
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	Two digit year code, e.g., '03'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

**MOC8111**

**MOC8112**

**MOC8113**

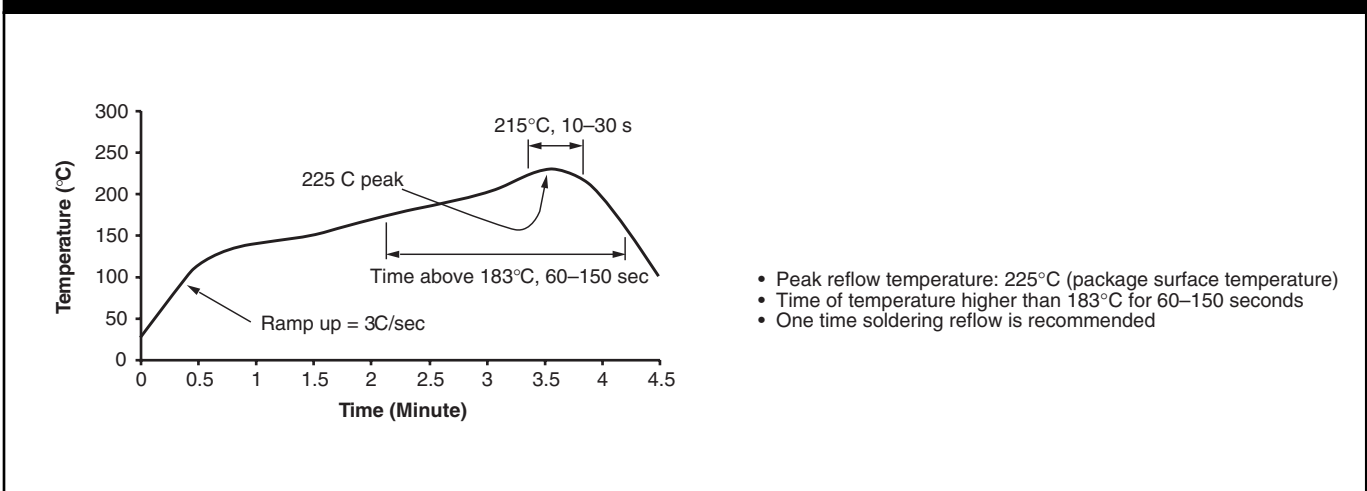
**Carrier Tape Specifications**



**NOTE**

All dimensions are in inches (millimeters)

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



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**MOC8111**

**MOC8112**

**MOC8113**

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