

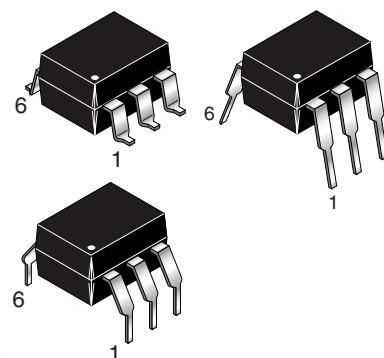
# 6-PIN DIP OPTOCOUPLERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

<b>MOC8101</b>	<b>MOC8102</b>	<b>MOC8103</b>	<b>MOC8104</b>
<b>MOC8105</b>	<b>MOC8106</b>	<b>MOC8107</b>	<b>MOC8108</b>
<b>CNY17F-1</b>	<b>CNY17F-2</b>	<b>CNY17F-3</b>	<b>CNY17F-4</b>

## FEATURES

The MOC810X and CNY17F-X devices consist of a gallium arsenide LED optically coupled to a silicon phototransistor in a dual-in-line package.

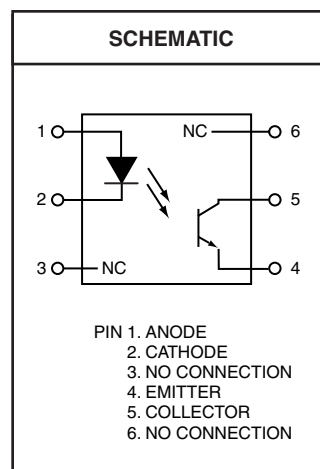
- Closely Matched Current Transfer Ratio (CTR) Minimizes Unit-to-Unit Variation
- Narrow (CTR) Windows that Translate to a Narrow and Predictable Open Loop Gain Window
- Very Low Coupled Capacitance along with No Chip to Pin 6 Base Connection for Minimum Noise Susceptibility
- **To order devices that are tested and marked per VDE 0884 requirements, the suffix “.300” must be included at the end of part number. e.g. MOC8101.300 VDE 0884 is a test option.**



## APPLICATIONS

- Switchmode Power Supplies (Feedback Control)
- AC Line/Digital Logic Isolation
- Interfacing and coupling systems of different potentials and impedances

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C Unless otherwise specified)			
Parameter	Symbol	Value	Unit
<b>INPUT LED</b>			
Forward Current - Continuous	I <sub>F</sub>	100	mA
Forward Current - Peak (PW = 1μs, 300pps)	I <sub>F(pk)</sub>	1	A
Reverse Voltage	V <sub>R</sub>	6	Volts
LED Power Dissipation @ T <sub>A</sub> = 25°C	P <sub>D</sub>	140	mW
Derate above 25°C		1.33	mW/°C
<b>OUTPUT TRANSISTOR</b>			
Collector-Emitter Voltage	V <sub>CEO</sub>	70	Volts
MOC8106/7/8, CNY17F-1/2/3/4		30	
MOC8101/2/3/4/5			
Emitter-Collector Voltage	V <sub>ECO</sub>	7	Volts
Detector Power Dissipation @ T <sub>A</sub> = 25°C	P <sub>D</sub>	200	mW
Derate above 25°C		2.67	mW/°C
<b>TOTAL DEVICE</b>			
Input-Output Isolation Voltage <sup>(1)</sup> (f = 60 Hz, t = 1 min.)	V <sub>ISO</sub>	5300	Vac(rms)
Total Device Power Dissipation @ T <sub>A</sub> = 25°C	P <sub>D</sub>	260	mW
Derate above 25°C		2.94	mW/°C
Ambient Operating Temperature Range	T <sub>OPR</sub>	-55 to +100	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C
Lead Soldering Temperature (1/16" from case, 10 sec. duration)	T <sub>SOL</sub>	260	°C



## NOTE

1. Input-Output Isolation Voltage, V<sub>ISO</sub>, is an internal device dielectric breakdown rating.

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<b>MOC8105</b>	<b>MOC8106</b>	<b>MOC8107</b>	<b>MOC8108</b>
<b>CNY17F-1</b>	<b>CNY17F-2</b>	<b>CNY17F-3</b>	<b>CNY17F-4</b>

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified) <sup>(1)</sup>						
Characteristic	Symbol	Min	Typ**	Max	Unit	
<b>INPUT LED</b>						
Forward Voltage ( $I_F = 60\text{ mA}$ )	$V_F$	1.0	1.4	1.65	V	
Reverse Leakage Current ( $V_R = 5.0\text{ V}$ )	$I_R$	—	0.001	10	$\mu\text{A}$	
Capacitance	C	—	18	—	pF	
<b>OUTPUT TRANSISTOR</b>						
Collector-Emitter Dark Current ( $V_{CE} = 10\text{ V}$ , $T_A = 25^\circ\text{C}$ )	$I_{CEO1}$	—	1.0	50	nA	
( $V_{CE} = 10\text{ V}$ , $T_A = 100^\circ\text{C}$ )	$I_{CEO2}$	—	1.0	—	$\mu\text{A}$	
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30	100	—	V	
MOC8101/2/3/4/5 ( $I_C = 1.0\text{ mA}$ )						
MOC8106/7/8, CNY17F-1/2/3/4 ( $I_C = 1.0\text{ mA}$ )		70	100	—		
Emitter-Collector Breakdown Voltage ( $I_E = 100\text{ }\mu\text{A}$ )	$V_{(BR)ECO}$	7.0	10	—	V	
Collector-Emitter Capacitance ( $f = 1.0\text{ MHz}$ , $V_{CE} = 0$ )	$C_{CE}$	—	8	—	pF	
<b>COUPLED</b>						
Output Collector Current ( $I_F = 10\text{ mA}$ , $V_{CE} = 10\text{ V}$ )	MOC8101	(CTR) <sup>(2)</sup>	50	—	80	%
	MOC8102		73	—	117	
	MOC8103		108	—	173	
	MOC8104		160	—	256	
	MOC8105		65	—	133	
	MOC8106		50	—	150	
	MOC8107		100	—	300	
	MOC8108		250	—	600	
(I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5 V)	CNY17F-1		40	—	80	
	CNY17F-2		63	—	125	
	CNY17F-3		100	—	200	
	CNY17F-4		160	—	320	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	0.4	V	
CNY17F-1/2/3/4 ( $I_C = 2.5\text{ mA}$ , $I_F = 10\text{ mA}$ )						
MOC8101/2/3/4/5/6/7/8 ( $I_C = 500\text{ }\mu\text{A}$ , $I_F = 5.0\text{ mA}$ )						
Isolation Voltage ( $f = 60\text{ Hz}$ , $t = 1.0\text{ min.}$ ) <sup>(4)</sup>	$V_{ISO}$	5300	—	—	Vac(rms)	
Isolation Resistance ( $V_{I-O} = 500\text{ V}$ ) <sup>(4)</sup>	$R_{ISO}$	$10^{11}$	—	—	$\Omega$	
Isolation Capacitance ( $V_{I-O} = 0$ , $f = 1.0\text{ MHz}$ ) <sup>(4)</sup>	$C_{ISO}$	—	0.5	—	pF	

\*\* All typicals at  $T_A = 25^\circ\text{C}$

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<b>MOC8105</b>	<b>MOC8106</b>	<b>MOC8107</b>	<b>MOC8108</b>
<b>CNY17F-1</b>	<b>CNY17F-2</b>	<b>CNY17F-3</b>	<b>CNY17F-4</b>

<b>TRANSFER CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified)						
AC Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Unit
<b>NON-SATURATED SWITCHING TIME</b>						
Turn-on Time	CNY17F-1/2/3/4 Only ( $R_L = 100 \Omega$ , $I_C = 2 \text{ mA}$ )	$t_{on}$	—	2	10	$\mu\text{s}$
Turn-off Time	CNY17F-1/2/3/4 Only ( $V_{CC} = 10 \text{ V}$ )	$t_{off}$	—	3	10	
Turn-On Time	All Devices ( $I_C = 2.0 \text{ mA}$ , $V_{CC} = 10 \text{ V}$ , $R_L = 100 \Omega$ ) <sup>(3)</sup>	$t_{on}$	—	2	—	$\mu\text{s}$
Turn-Off Time	All Devices ( $I_C = 2.0 \text{ mA}$ , $V_{CC} = 10 \text{ V}$ , $R_L = 100 \Omega$ ) <sup>(3)</sup>	$t_{off}$	—	3	—	
Rise Time	All Devices ( $I_C = 2.0 \text{ mA}$ , $V_{CC} = 10 \text{ V}$ , $R_L = 100 \Omega$ ) <sup>(3)</sup>	$t_r$	—	1	—	$\mu\text{s}$
Fall Time	All Devices ( $I_C = 2.0 \text{ mA}$ , $V_{CC} = 10 \text{ V}$ , $R_L = 100 \Omega$ ) <sup>(3)</sup>	$t_f$	—	2	—	
<b>SATURATED SWITCHING TIMES</b>						
Turn-on Time	CNY17F-1 ( $I_F = 20 \text{ mA}$ , $V_{CE} = 0.4 \text{ V}$ )	$t_{on}$	—	—	5.5	$\mu\text{s}$
	CNY17F-2 ( $I_F = 10 \text{ mA}$ , $V_{CE} = 0.4 \text{ V}$ )		—	—	8.0	
	CNY17F-3		—	—	—	
	CNY17F-4		—	—	—	
Rise Time	CNY17F-1 ( $I_F = 20 \text{ mA}$ , $V_{CE} = 0.4 \text{ V}$ )	$t_r$	—	—	4.0	$\mu\text{s}$
	CNY17F-2 ( $I_F = 10 \text{ mA}$ , $V_{CE} = 0.4 \text{ V}$ )		—	—	6.0	
	CNY17F-3		—	—	—	
	CNY17F-4		—	—	—	
Turn-off Time	CNY17F-1 ( $I_F = 20 \text{ mA}$ , $V_{CE} = 0.4 \text{ V}$ )	$t_{off}$	—	—	34	$\mu\text{s}$
	CNY17F-2 ( $I_F = 10 \text{ mA}$ , $V_{CE} = 0.4 \text{ V}$ )		—	—	39	
	CNY17F-3		—	—	—	
	CNY17F-4		—	—	—	
Fall Time	CNY17F-1 ( $I_F = 20 \text{ mA}$ , $V_{CE} = 0.4 \text{ V}$ )	$t_f$	—	—	20	$\mu\text{s}$
	CNY17F-2 ( $I_F = 10 \text{ mA}$ , $V_{CE} = 0.4 \text{ V}$ )		—	—	24	
	CNY17F-3		—	—	—	
	CNY17F-4		—	—	—	

\*\* All typicals at  $T_A = 25^\circ\text{C}$

**NOTES:**

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .
3. For test circuit setup and waveforms, refer to Figure 7.
4. For this test, Pins 1 and 2 are common, and Pins 4 and 5 are common.

**MOC8101  
MOC8105  
CNY17F-1**

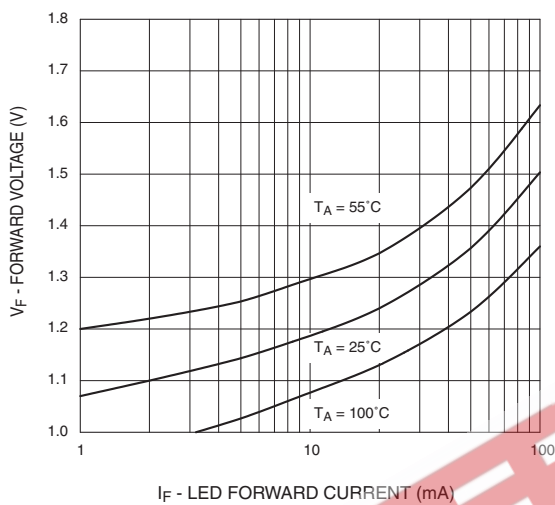
**MOC8102  
MOC8106  
CNY17F-2**

**MOC8103  
MOC8107  
CNY17F-3**

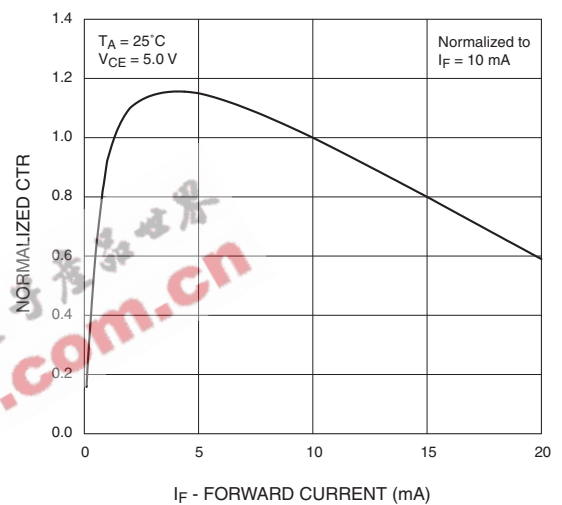
**MOC8104  
MOC8108  
CNY17F-4**

**TYPICAL PERFORMANCE CURVES**

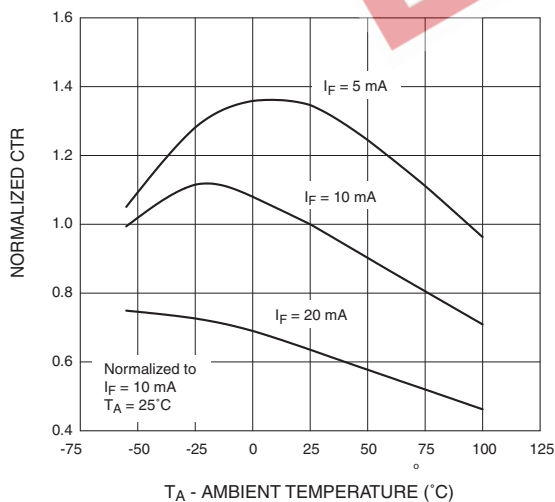
**Fig. 1 LED Forward Voltage vs. Forward Current**



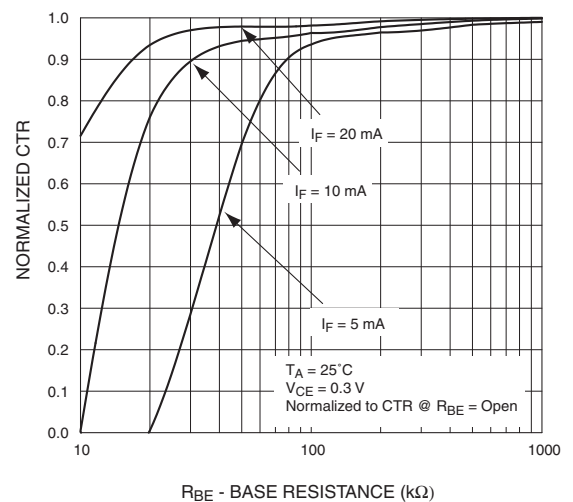
**Fig. 2 Normalized CTR vs. Forward Current**



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



**Fig. 4 CTR vs. RBE (Saturated)**



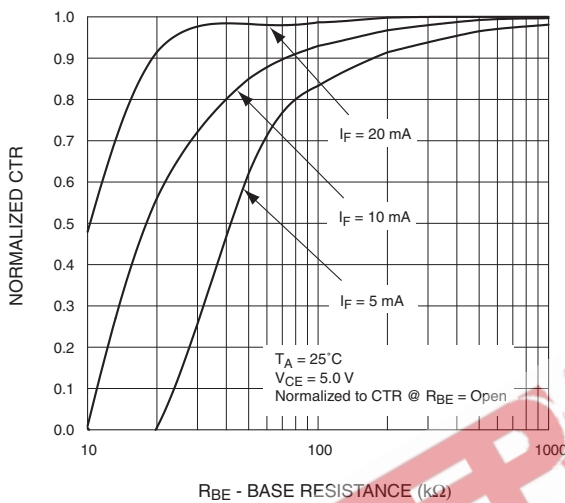
MOC8101  
MOC8105  
CNY17F-1

MOC8102  
MOC8106  
CNY17F-2

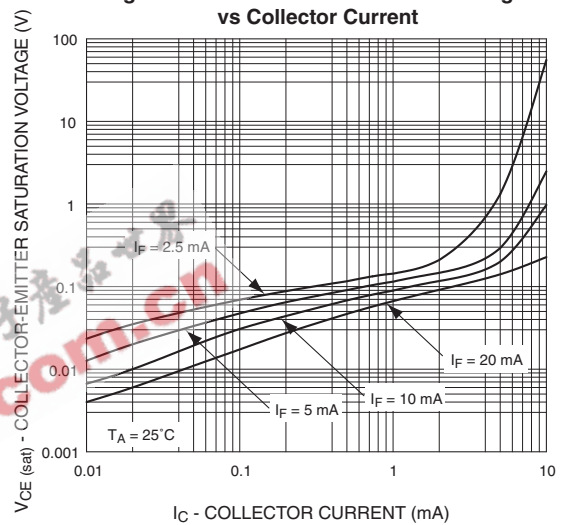
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CNY17F-3

MOC8104  
MOC8108  
CNY17F-4

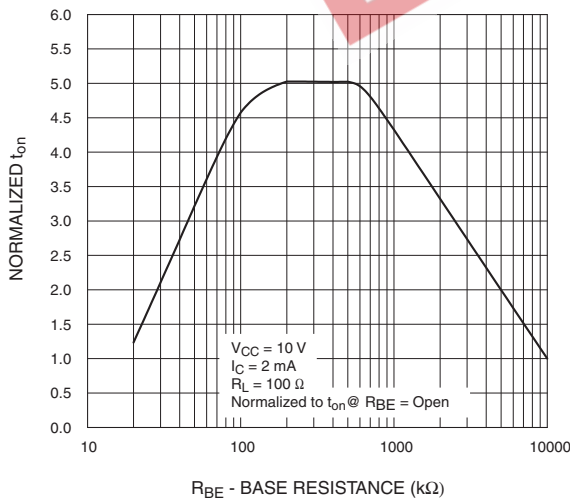
**Fig. 5 CTR vs. R<sub>BE</sub> (Unsaturated)**



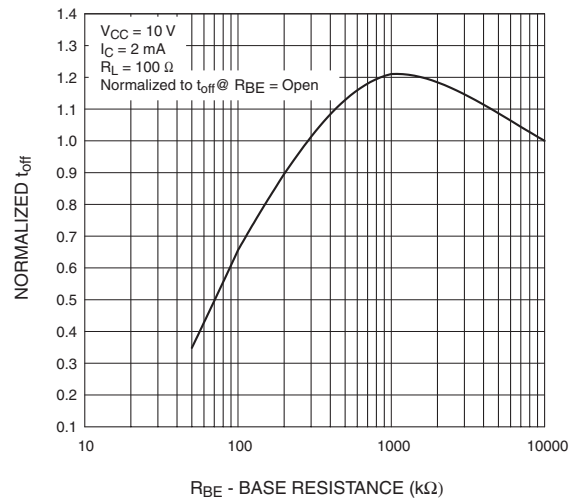
**Fig. 6 Collector Emitter Saturation Voltage vs Collector Current**



**Fig. 7 Normalized t<sub>on</sub> vs. R<sub>BE</sub>**



**Fig. 8 Normalized t<sub>off</sub> vs. R<sub>BE</sub>**



MOC8101  
MOC8105  
CNY17F-1

MOC8102  
MOC8106  
CNY17F-2

MOC8103  
MOC8107  
CNY17F-3

MOC8104  
MOC8108  
CNY17F-4

Fig. 9 Switching Speed vs. Load Resistor

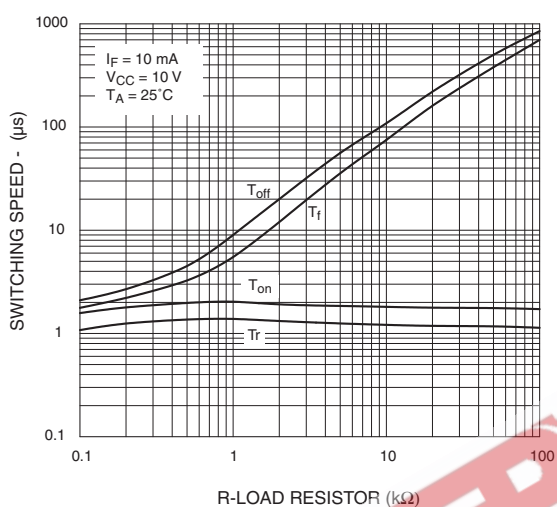
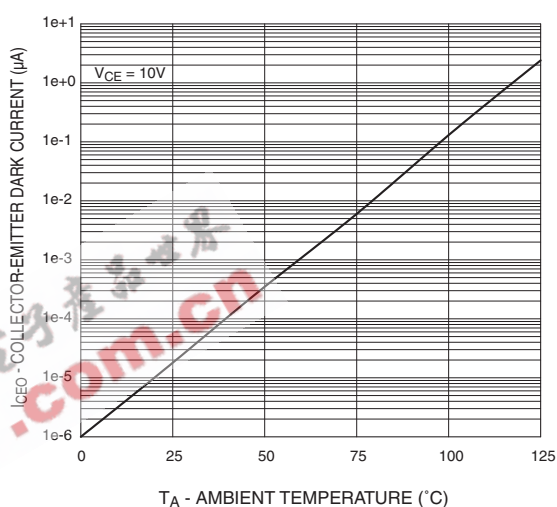
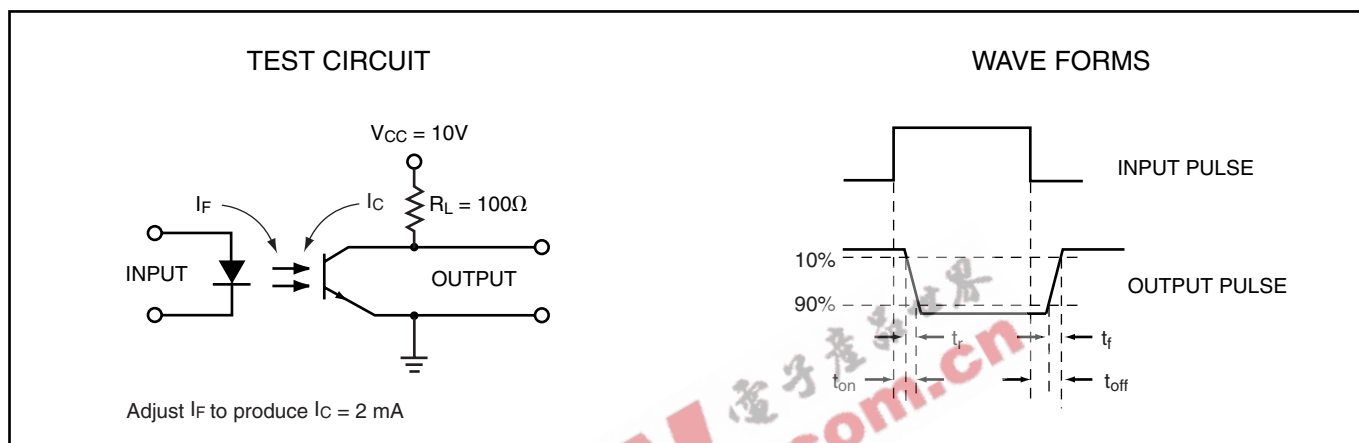


Fig. 10 Dark current vs. Ambient Temperature.



MOC8101	MOC8102	MOC8103	MOC8104
MOC8105	MOC8106	MOC8107	MOC8108
CNY17F-1	CNY17F-2	CNY17F-3	CNY17F-4

Figure 7. Switching Time Test Circuit and Waveforms



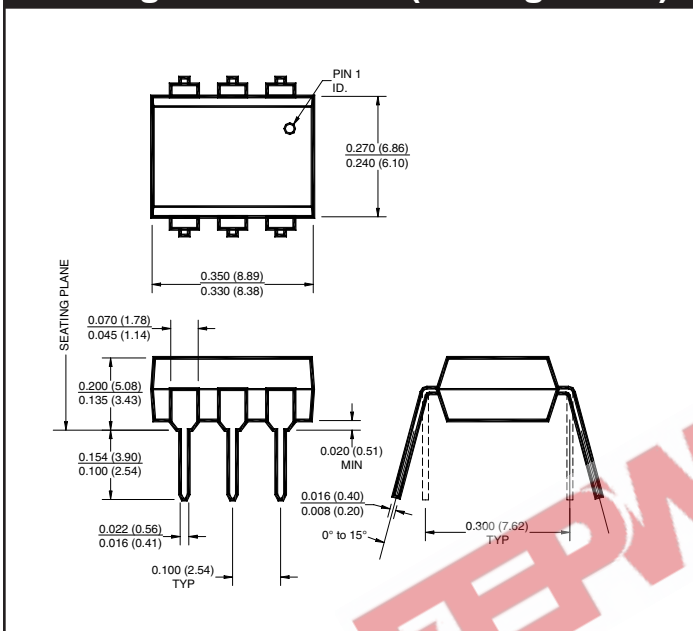
MOC8101  
MOC8105  
CNY17F-1

MOC8102  
MOC8106  
CNY17F-2

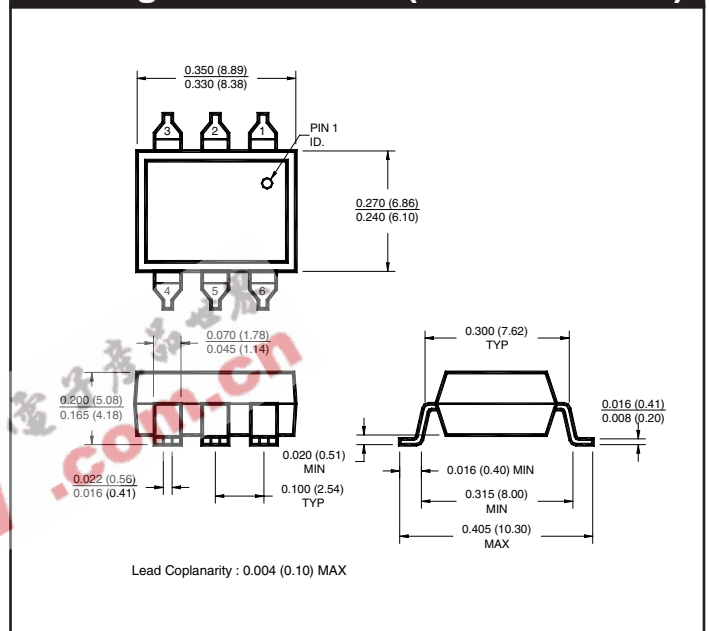
MOC8103  
MOC8107  
CNY17F-3

MOC8104  
MOC8108  
CNY17F-4

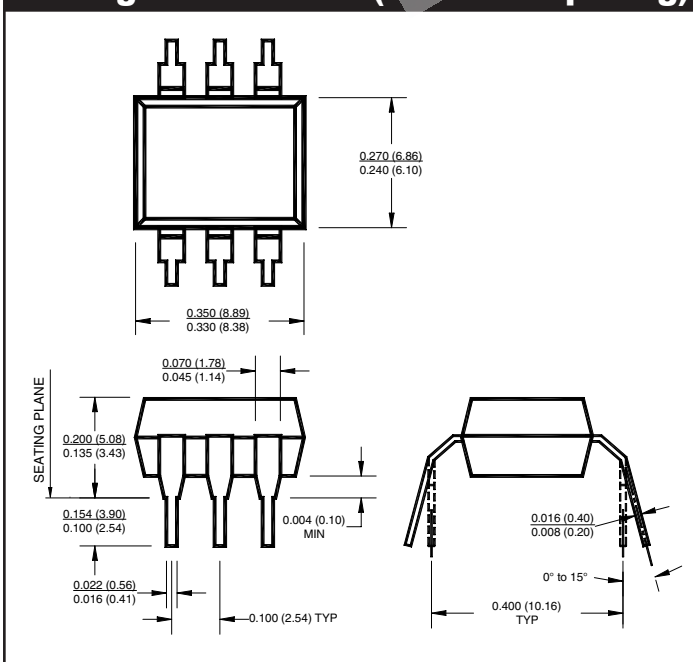
**Package Dimensions (Through Hole)**



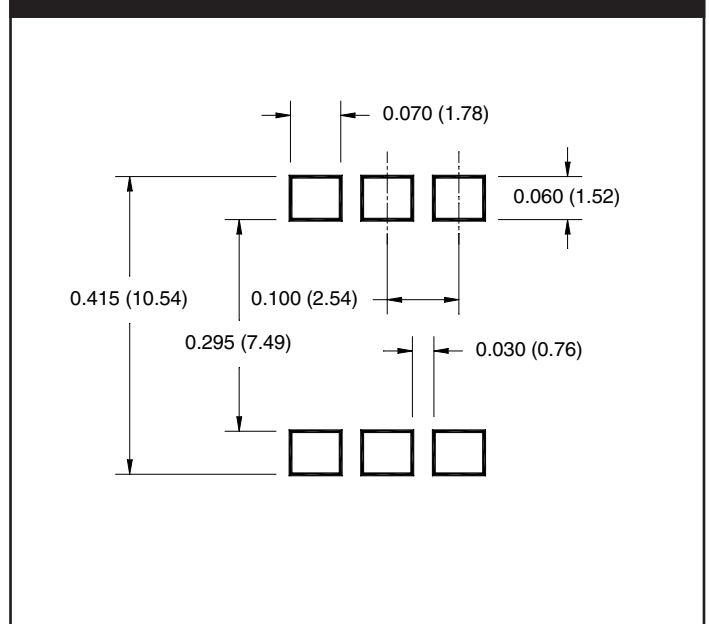
**Package Dimensions (Surface Mount)**



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



**Recommended Pad Layout for  
Surface Mount Leadform**



**NOTE**

All dimensions are in inches (millimeters)

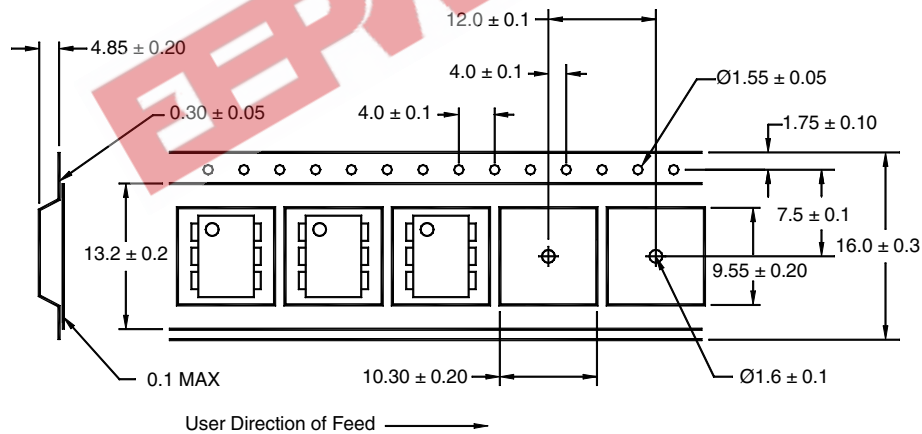


MOC8101	MOC8102	MOC8103	MOC8104
MOC8105	MOC8106	MOC8107	MOC8108
CNY17F-1	CNY17F-2	CNY17F-3	CNY17F-4

**ORDERING INFORMATION**

Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4" Lead Spacing
300	.300	VDE 0884
300W	.300W	VDE 0884, 0.4" Lead Spacing
3S	.3S	VDE 0884, Surface Mount
3SD	.3SD	VDE 0884, Surface Mount, Tape & Reel

**QT Carrier Tape Specifications ("D" Taping Orientation)**



**NOTE**

All dimensions are in inches (millimeters)

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<b>MOC8105</b>	<b>MOC8106</b>	<b>MOC8107</b>	<b>MOC8108</b>
<b>CNY17F-1</b>	<b>CNY17F-2</b>	<b>CNY17F-3</b>	<b>CNY17F-4</b>

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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.