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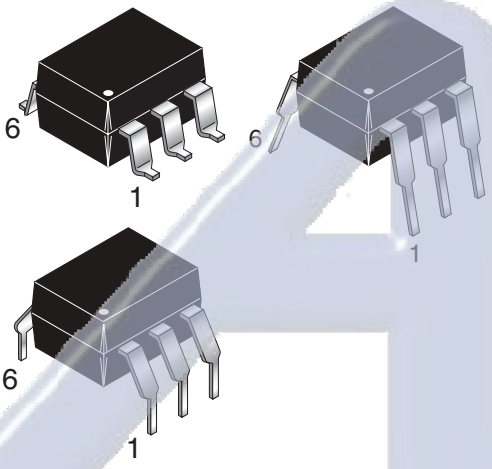
FAIRCHILD SEMICONDUCTOR®

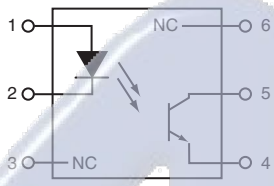
6-PIN DIP OPTOCOUPLERS FOR POWER SUPPLY APPLICATIONS (NO BASE CONNECTION)

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

PACKAGE



SCHEMATIC



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

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

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CNY17F-1	**CNY17F-2**	**CNY17F-3**	**CNY17F-4**

ABSOLUTE MAXIMUM RATINGS (T_A =25°C Unless otherwise specified)

Parameter	Symbol	Value	Unit
INPUT LED			
Forward Current - Continuous	I_F	100	mA
Forward Current - Peak (PW = 1µs, 300pps)	I_F(pk)	1	A
Reverse Voltage	V_R	6	Volts
LED Power Dissipation @ T_A = 25°C	P_D	150	mW
Derate above 25°C		2.0	mW/°C
OUTPUT TRANSISTOR			
Collector-Emitter Voltage			
MOC8106/7/8, CNY17F-1/2/3/4	V_{CEO}	70	Volts
MOC8101/2/3/4/5		30	
Emitter-Collector Voltage	V_{ECO}	7	Volts
Detector Power Dissipation @ T_A = 25°C	P_D	150	mW
Derate above 25°C		2.0	mW/°C
TOTAL DEVICE			
Input-Output Isolation Voltage (f = 60 Hz, t = 1 min.)	V_{ISO}	5300	Vac(rms)
Total Device Power Dissipation @ T_A = 25°C	P_D	250	mW
Derate above 25°C		3.3	mW/°C
Ambient Operating Temperature Range	T_{OPR}	-55 to +100	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C
Lead Soldering Temperature (1/16" from case, 10 sec. duration)	T_{SOL}	260	°C

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CNY17F-1	**CNY17F-2**	**CNY17F-3**	**CNY17F-4**

ELECTRICAL CHARACTERISTICS (T_A =25°C Unless otherwise specified)(1)

Characteristic		Symbol	Min	Typ**	Max	Unit
INPUT LED						
Forward Voltage (I_F = 60 mA)	CNY17F-X	V_F	—	1.40	1.65	V
(I_F = 10 mA)	MOC810X		1.0	1.18	1.5	
Reverse Leakage Current (V_R = 5.0 V)		I_R	—	0.001	10	µA
Capacitance		C	—	18	—	pF
OUTPUT TRANSISTOR						
Collector-Emitter Dark Current	(V_{CE} = 10 V, T_A = 25°C)	I_{CEO1}	—	1.0	50	nA
	(V_{CE} = 10 V, T_A = 100°C)	I_{CEO2}	—	1.0	—	µA
Collector-Emitter Breakdown Voltage						
MOC8101/2/3/4/5	(I_C = 1.0 mA)	$V_{(BR)\ CEO}$	30	100	—	V
MOC8106/7/8, CNY17F-1/2/3/4	(I_C = 1.0 mA)		70	100	—	
Emitter-Collector Breakdown Voltage	(I_E = 100 µA)	$V_{(BR)\ ECO}$	7.0	10	—	V
Collector-Emitter Capacitance	(f = 1.0 MHz, V_{CE} = 0)	C_{CE}	—	8	—	pF
COUPLED						
Output Collector Current (I_F = 10 mA, V_{CE} = 10 V)	MOC8101	(CTR)(2)	50	—	80	%
	MOC8102		73	—	117	
	MOC8103		108	—	173	
	MOC8104		160	—	256	
	MOC8105		65	—	133	
	MOC8106		50	—	150	
	MOC8107		100	—	300	
	MOC8108		250	—	600	
(I_F = 10 mA, V_{CE} = 5 V)	CNY17F-1		40	—	80	
	CNY17F-2		63	—	125	
	CNY17F-3		100	—	200	
	CNY17F-4		160	—	320	
Collector-Emitter Saturation Voltage						
CNY17F-1/2/3/4	(I_C = 2.5 mA, I_F = 10 mA)	$V_{CE(sat)}$	—	—	0.4	V
MOC8101/2/3/4/5/6/7/8	(I_C = 500 µA, I_F = 5.0 mA)					
Isolation Voltage	(f = 60 Hz, t = 1.0 min.)(4)	V_{ISO}	5300	—	—	Vac(rms)
Isolation Resistance	(V_{I-O} = 500 V)(4)	R_{ISO}	10^{11}	—	—	Ω
Isolation Capacitance	(V_{I-O} = 0, f = 1.0 MHz)(4)	C_{ISO}	—	0.5	—	pF

** All typicals at T_A = 25°C

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

TRANSFER CHARACTERISTICS (T_A =25°C Unless otherwise specified)

AC Characteristic		Test Conditions	Symbol	Min	Typ**	Max	Unit
NON-SATURATED SWITCHING TIME							
Turn-on Time CNY17F-1/2/3/4 Only		(R_L = 100 Ω, I_C = 2 mA)	t_{on}	—	2	10	µs
Turn-off Time CNY17F-1/2/3/4 Only		(V_{CC} = 10 V)	t_{off}	—	3	10	
Turn-On Time	MOC8101-5	(I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω)(3)	t_{on}	—	2	20	µs
	MOC8106-8					—	
Turn-Off Time	MOC8101-5	(I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω)(3)	t_{off}	—	3	20	
	MOC8106-8					—	
Rise Time All Devices		(I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω)(3)	t_r	—	1	—	µs
Fall Time All Devices		(I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω)(3)	t_f	—	2	—	
SATURATED SWITCHING TIMES							
Turn-on Time CNY17F-1		(I_F = 20 mA, V_{CE} = 0.4 V)	t_{on}	—	—	5.5	µs
CNY17F-2 CNY17F-3 CNY17F-4		(I_F = 10 mA, V_{CE} = 0.4 V)		—	—	8.0	
Rise Time CNY17F-1		(I_F = 20 mA, V_{CE} = 0.4 V)	t_r	—	—	4.0	µs
CNY17F-2 CNY17F-3 CNY17F-4		(I_F = 20 mA, V_{CE} = 0.4 V)					
Turn-off Time CNY17F-1		(I_F = 20 mA, V_{CE} = 0.4 V)	t_{off}	—	—	34	µs
CNY17F-2 CNY17F-3 CNY17F-4		(I_F = 10 mA, V_{CE} = 0.4 V)		—	—	39	
Fall Time CNY17F-1		(I_F = 20 mA, V_{CE} = 0.4 V)	t_f	—	—	20	µs
CNY17F-2 CNY17F-3 CNY17F-4		(I_F = 10 mA, V_{CE} = 0.4 V)		—	—	24	

** All typicals at T_A = 25°C

NOTES:
1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) = I_C/I_F x 100%.
3. For test circuit setup and waveforms, refer to Figure 11.
4, For this test, Pins 1 and 2 are common, and Pins 4 are 5 are common.

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CNY17F-1	CNY17F-2	CNY17F-3	CNY17F-4

TYPICAL PERFORMANCE CURVES

Fig. 1 LED Forward Voltage vs. Forward Current

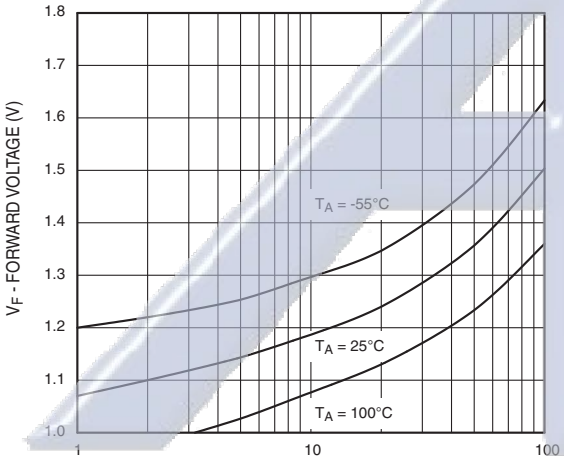


Fig. 2 Normalized CTR vs. Forward Current

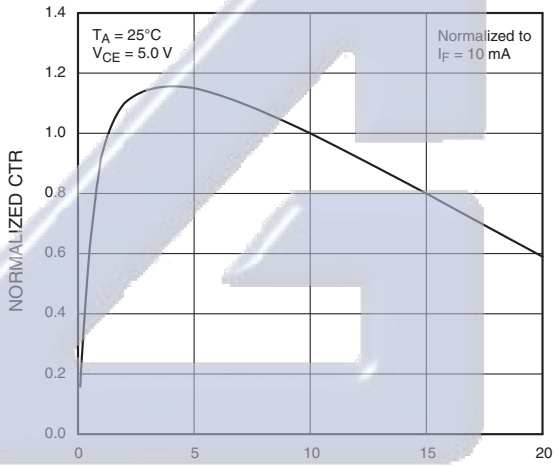


Fig. 3 Normalized CTR vs. Ambient Temperature

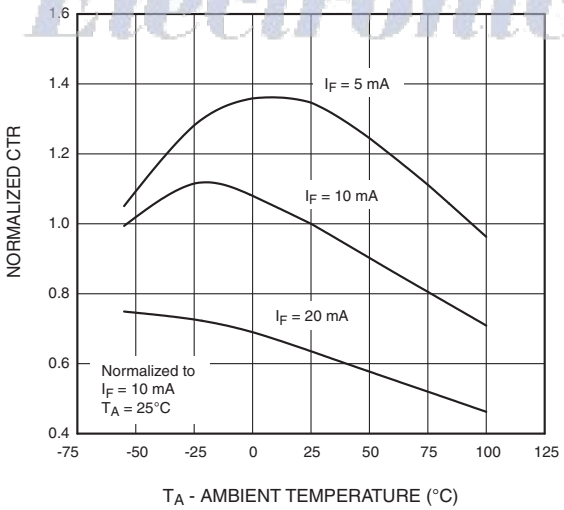
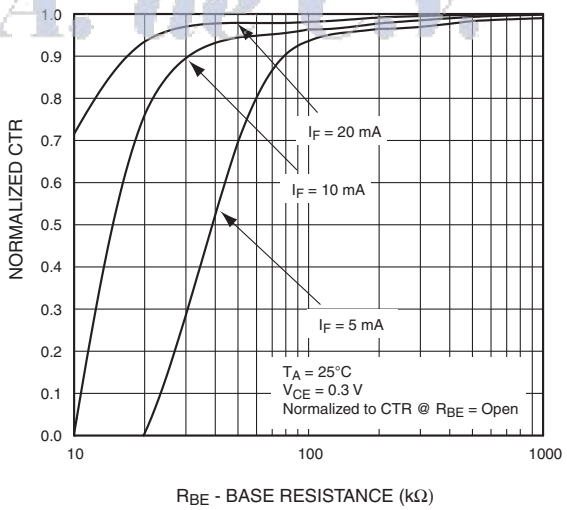


Fig. 4 CTR vs. RBE (Saturated)



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TYPICAL PERFORMANCE CURVES (continued)

Fig. 5 CTR vs. RBE (Unsaturated)

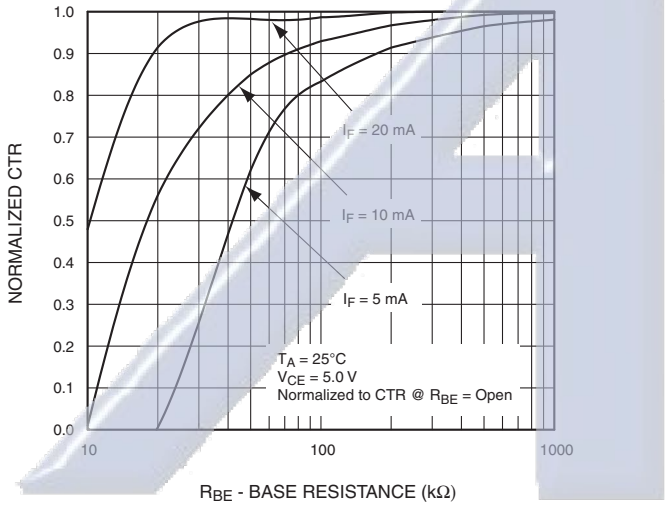


Fig. 6 Collector Emitter Saturation Voltage vs Collector Current

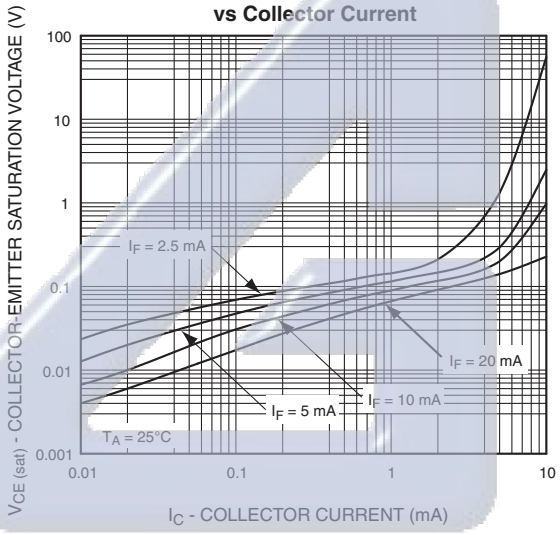


Fig. 7 Normalized t_{on} vs. R_{BE}

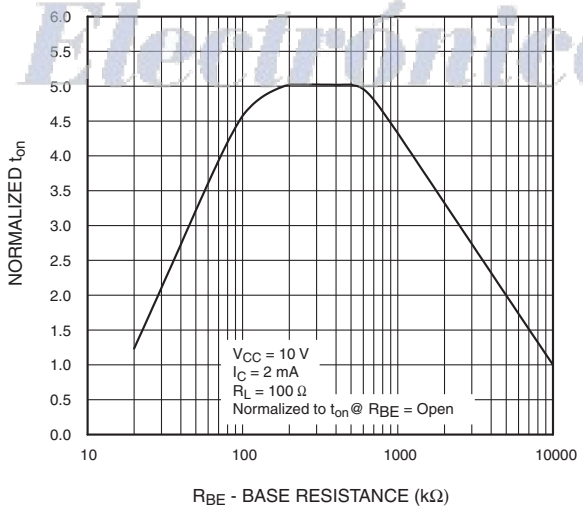
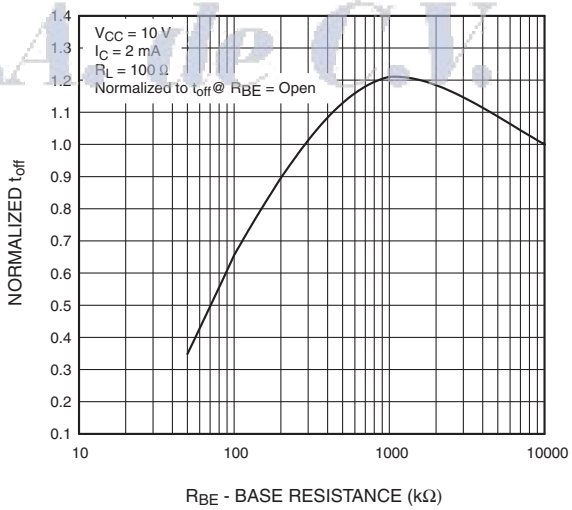


Fig. 8 Normalized t_{off} vs. R_{BE}



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CNY17F-1	CNY17F-2	CNY17F-3	CNY17F-4

TYPICAL PERFORMANCE CURVES (continued)

Fig. 9 Switching Speed vs. Load Resistor

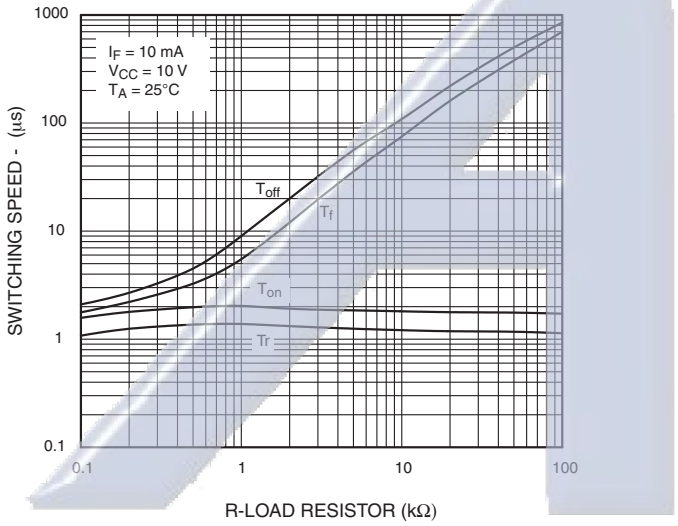

Fig. 10 Dark current vs. Ambient Temperature.

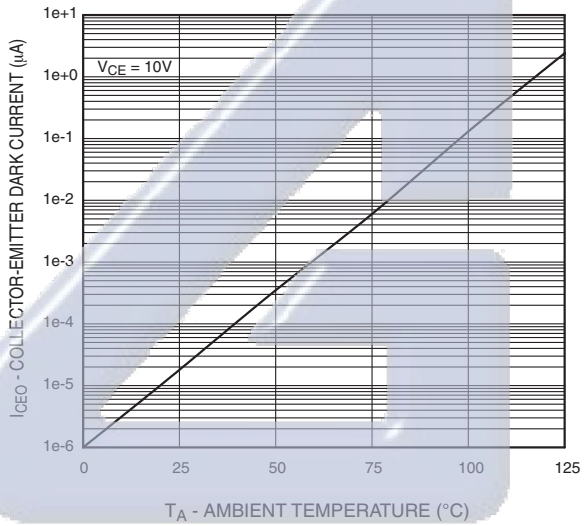

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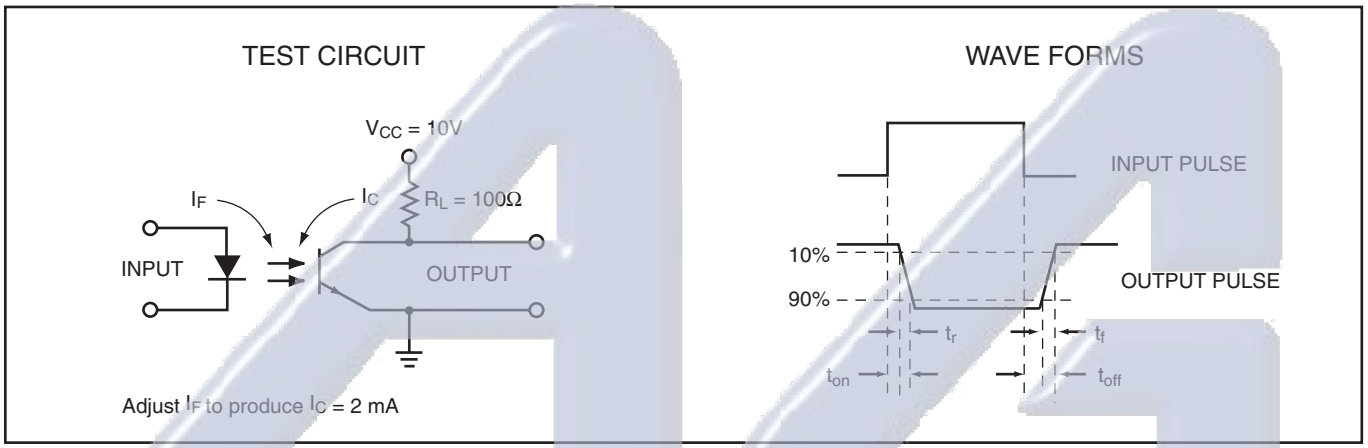
Figure 11. Switching Time Test Circuit and Waveforms



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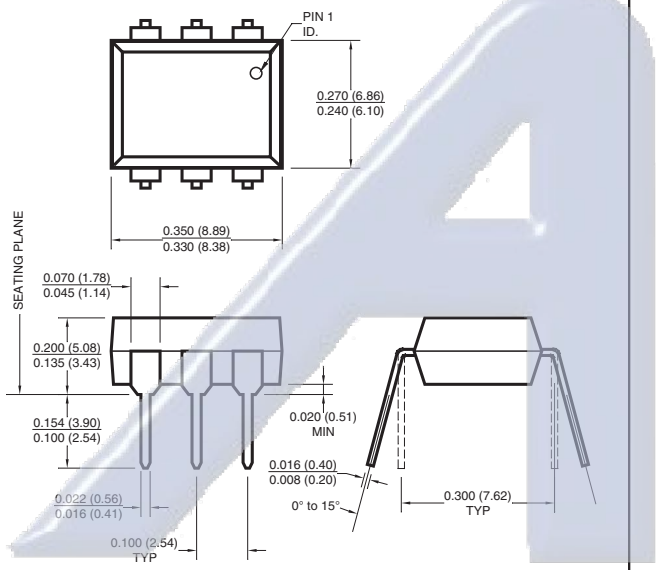
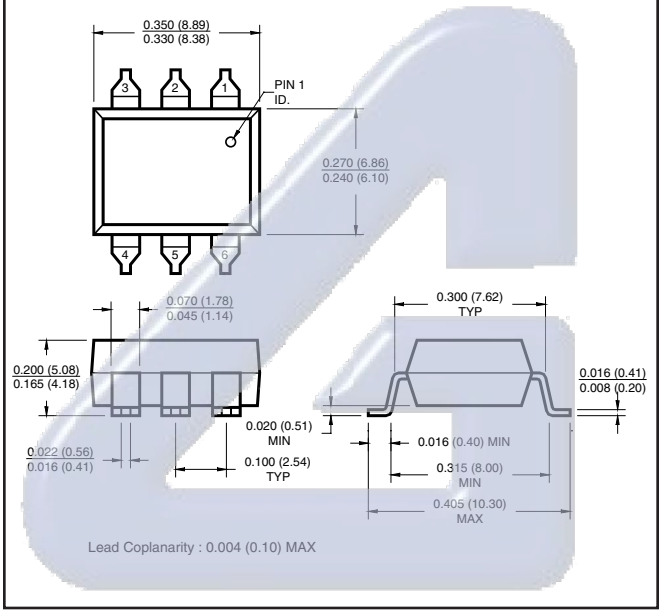
CNY17F-1	**CNY17F-2**	**CNY17F-3**	**CNY17F-4**

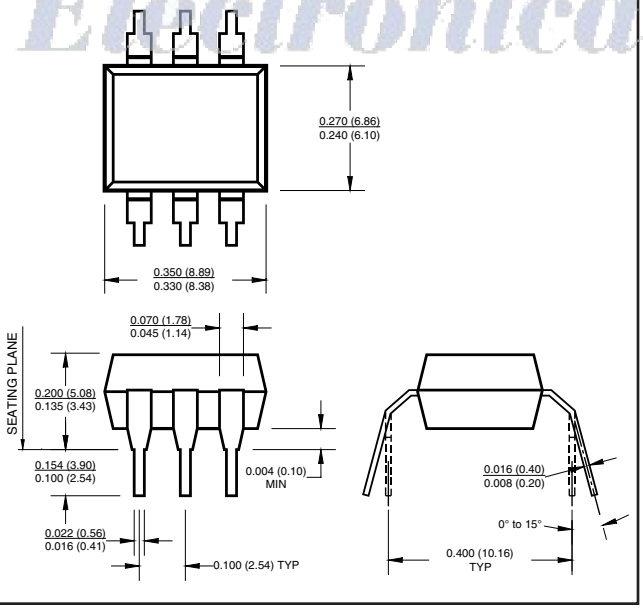
Package Dimensions (Through Hole)



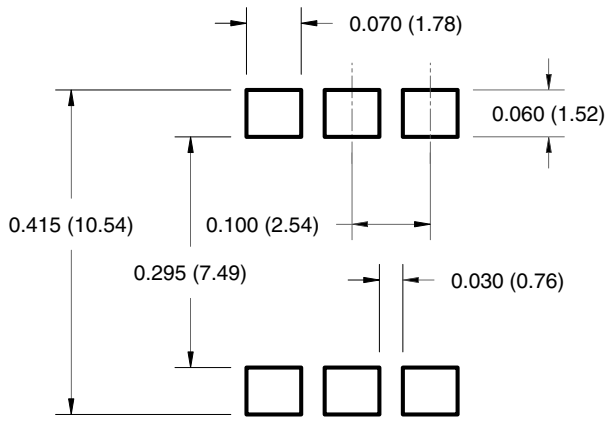
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE
All dimensions are in inches (millimeters)

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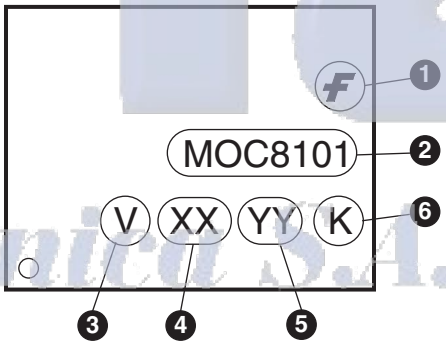
ORDERING INFORMATION

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 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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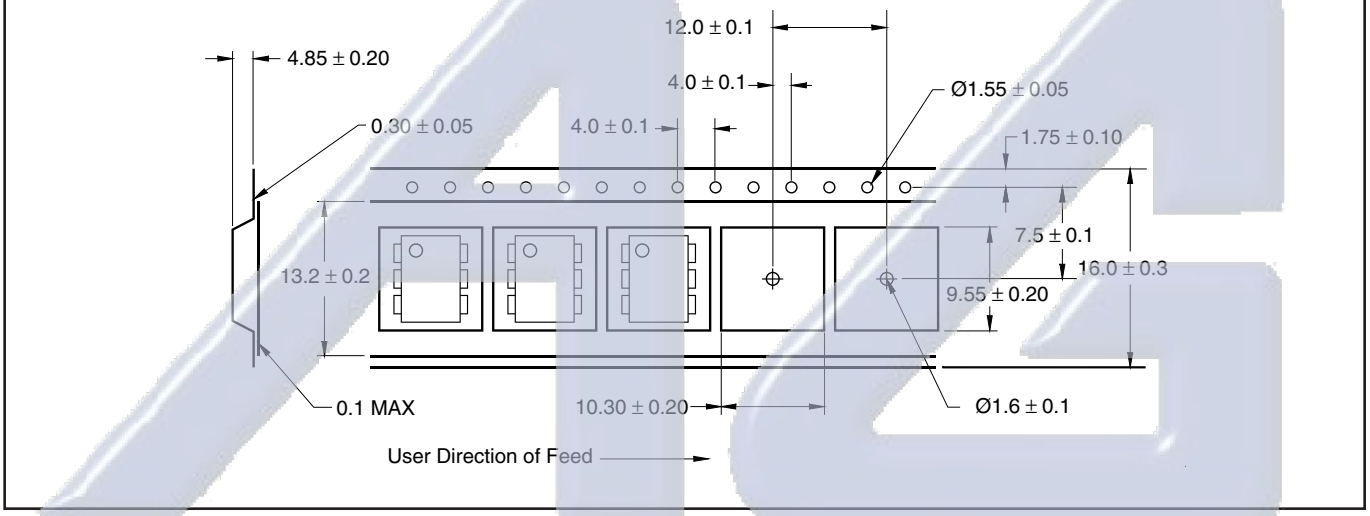
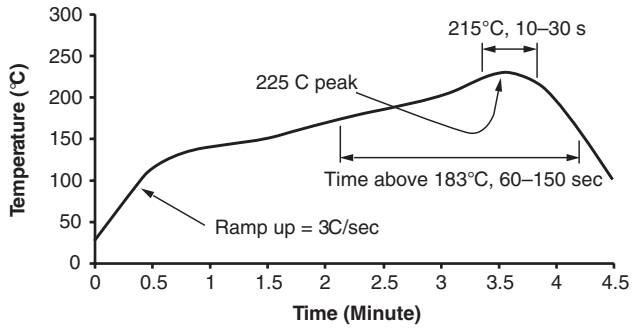
Carrier Tape Specifications ("D" Taping Orientation)



NOTE
All dimensions are in inches (millimeters)

Reflow Profile (Black Package, No Suffix)



- Peak reflow temperature: 225°C (package surface temperature)
- Time of temperature higher than 183°C for 60–150 seconds
- One time soldering reflow is recommended

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