CNY17 Series, MOC8106M

6-Pin DIP High B_{VCEO} Phototransistor Optocouplers

Description

The CNY17XM, CNY17FXM, and MOC8106M devices consist of a gallium arsenide infrared emitting diode coupled with an NPN phototransistor in a dual in−line package.

Features

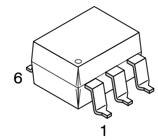
- High BV_{CEO}: 70 V Minimum (CNY17XM, CNY17FXM, MOC8106M)
- Closely Matched Current Transfer Ratio (CTR) Minimizes Unit−to−Unit Variation
- Current Transfer Ratio In Select Groups
- Very Low Coupled Capacitance Along With No Chip−to−Pin 6 Base Connection for Minimum Noise Susceptibility (CNY17FXM, MOC8106M)
- Safety and Regulatory Approvals:
  - UL1577, 4,170 VAC_{RMS} for 1 Minute
  - DIN−EN/IEC60747−5−5, 850 V Peak Working Insulation Voltage

Applications

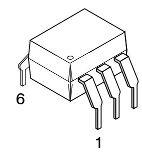
- Power Supply Regulators
- Digital Logic Inputs
- Microprocessor Inputs
- Appliance Sensor Systems
- Industrial Controls

ON Semiconductor®

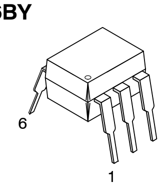
www.onsemi.com



PDIP6
CASE 646BY

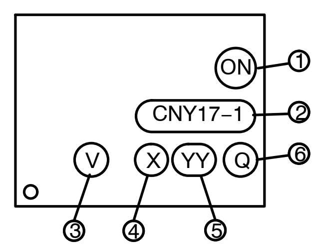


PDIP6
CASE 646BZ



PDIP6
CASE 646BX

MARKING DIAGRAM

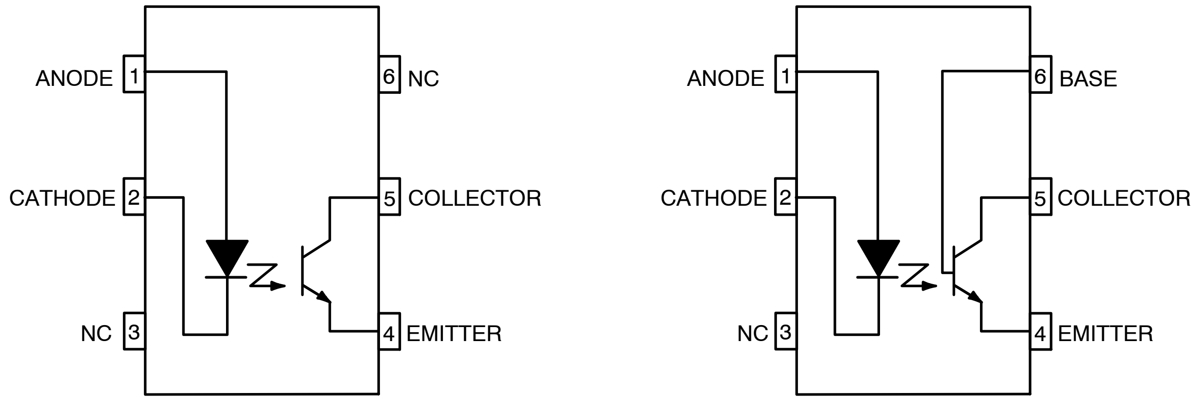


1.	ON	= Company Logo
2.	CNY17	= Device Number
3.	V	= DIN EN/IEC60747−5−5 Option (only appears on component ordered with this option)
4	X	= One−Digit Year Code
5.	YY	= Digit Work Week
6.	Q	= Assembly Package Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

SCHEMATICS



CNY17F1M/2M/3M/4M
MOC8106M

CNY171M/2M/3M/4M

Figure 1. Schematics

SAFETY AND INSULATION RATINGS

As per DIN EN/IEC 60747−5−5, this optocoupler is suitable for "safe electrical insulation" only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

Parameter		Characteristics
Installation Classifications per DIN VDE 0110/1.89 Table 1, For Rated Mains Voltage	< 150 V_{RMS}	I–IV
	< 300 V_{RMS}	I–III
Climatic Classification		55/100/21
Pollution Degree (DIN VDE 0110/1.89)		2
Comparative Tracking Index		175

Symbol	Parameter	Value	Unit
V_{PR}	Input−to−Output Test Voltage, Method A, V_{IORM} x 1.6 = V_{PR}, Type and Sample Test with t_m = 10 s, Partial Discharge < 5 pC	1360	Vpeak
	Input−to−Output Test Voltage, Method B, V_{IORM} x 1.875 = V_{PR}, 100% Production Test with t_m = 1 s, Partial Discharge < 5 pC	1594	Vpeak
V_{IORM}	Maximum Working Insulation Voltage	850	Vpeak
V_{IOTM}	Highest Allowable Over−Voltage	6000	Vpeak
	External Creepage	≥ 7	mm
	External Clearance	≥ 7	mm
	External Clearance (for Option TV, 0.4" Lead Spacing)	≥ 10	mm
DTI	Distance Through Insulation (Insulation Thickness)	≥ 0.5	mm
T_S	Case Temperature (Note 1)	175	°C
$I_{S, INPUT}$	Input Current (Note 1)	350	mA
$P_{S, OUTPUT}$	Output Power (Note 1)	800	mW
R_{IO}	Insulation Resistance at T_S, V_{IO} = 500 V (Note 1)	> 10^9	Ω

1. Safety limit values – maximum values allowed in the event of a failure.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Units
TOTAL DEVICE			
T_{STG}	Storage Temperature	−40 to +125	°C
T_A	Ambient Operating Temperature	−40 to +100	°C
T_J	Junction Temperature	−40 to +125	°C
T_{SOL}	Lead Solder Temperature	260 for 10 seconds	°C
P_D	Total Device Power Dissipation @ 25°C (LED plus detector)	270	mW
	Derate Linearly From 25°C	2.94	mW/°C
EMITTER			
I_F	Continuous Forward Current	60	mA
V_R	Reverse Voltage	6	V
I_F (pk)	Forward Current – Peak (1 μs pulse, 300 pps)	1.5	A
P_D	LED Power Dissipation 25°C Ambient	120	mW
	Derate Linearly From 25°C	1.41	mW/°C
DETECTOR			
I_C	Continuous Collector Current	50	mA
V_{CEO}	Collector−Emitter Voltage	70	V
V_{ECO}	Emitter Collector Voltage	7	V
P_D	Detector Power Dissipation @ 25°C	150	mW
	Derate Linearly from 25°C	1.76	mW/°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise specified)

INDIVIDUAL COMPONENT CHARACTERISTICS

Symbol	Parameter	Test Conditions	Device	Min.	Typ.	Max.	Unit
EMITTER							
V_F	Input Forward Voltage	I_F = 10 mA	All Devices	1.0	1.15	1.50	V
		I_F = 60 mA	CNY17XM, CNY17FXM	1.0	1.35	1.65	V
C_J	Capacitance	V_F = 0 V, f = 1.0 MHz	All Devices		18		pF
I_R	Reverse Leakage Current	V_R = 6 V	All Devices		0.001	10	μA
DETECTOR							
BV_{CEO}	Breakdown Voltage Collector−to−Emitter	I_C = 1 mA, I_F = 0	All Devices	70	100		V
BV_{CBO}	Collector−to−Base	I_C = 10 μA, I_F = 0	CNY17XM	70	120		V
BV_{ECO}	Emitter−to−Collector	I_E = 100 μA, I_F = 0	All Devices	7	10		V
I_{CEO}	Leakage Current Collector−to−Emitter	V_{CE} = 10 V, I_F = 0	All Devices		1	50	nA
I_{CBO}	Collector−to−Base	V_{CB} = 10 V, I_F = 0	CNY17XM			20	nA
C_{CE}	Capacitance Collector−to−Emitter	V_{CE} = 0, f = 1 MHz	All Devices		8		pF
C_{CB}	Collector−to−Base	V_{CB} = 0, f = 1 MHz	CNY17XM		20		pF
C_{EB}	Emitter−to−Base	V_{EB} = 0, f = 1 MHz	CNY17XM		10		pF

TRANSFER CHARACTERISTICS

Symbol	Parameter	Test Conditions	Device	Min.	Typ.	Max.	Unit
COUPLED							
CTR	Current Transfer Ratio	I_F = 10 mA, V_{CE} = 10 V	MOC8106M	50		150	%
		I_F = 10 mA, V_{CE} = 5 V	CNY171M, CNY17F1M	40		80	%
		I_F = 10 mA, V_{CE} = 5 V	CNY172M, CNY17F2M	63		125	%
		I_F = 10 mA, V_{CE} = 5 V	CNY173M, CNY17F3M	100		200	%
		I_F = 10 mA, V_{CE} = 5 V	CNY174M, CNY17F4M	160		320	%
$V_{CE(SAT)}$	Collector−Emitter Saturation Voltage	I_C = 0.5 mA, I_F = 5 mA	MOC8106M			0.4	V
		I_C = 2.5 mA, I_F = 10 mA	CNY17XM/CNY17FXM				

AC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Device	Min.	Typ.	Max.	Unit
NON−SATURATED SWITCHING TIME							
ton	Turn−On Time	I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω	All Devices		2.0	10.0	μs
toff	Turn−Off Time	I_C = 2.0 mA, V_{CC} = 10 V, R_L = 100 Ω	All Devices		3.0	10.0	μs
t_d	Delay Time	I_F = 10 mA, V_{CC} = 5 V, R_L = 75 Ω	CNY17XM/CNY17FXM			5.6	μs
t_r	Rise Time	I_F = 10 mA, V_{CC} = 5 V, R_L = 75 Ω	CNY17XM/CNY17FXM			4.0	μs
t_s	Storage Time	I_F = 10 mA, V_{CC} = 5 V, R_L = 75 Ω	CNY17XM/CNY17FXM			4.1	μs
t_f	Fall Time	I_F = 10 mA, V_{CC} = 5 V, R_L = 75 Ω	CNY17XM/CNY17FXM			3.5	μs
SATURATED SWITCHING TIME							
t_d	Delay Time	I_F = 20 mA, V_{CC} = 5 V, R_L = 1 kΩ	CNY171M/F1M			5.5	μs
		I_F = 10 mA, V_{CC} = 5 V, R_L = 1 kΩ	CNY172M/3M/4M CNY17F2M/F3M/F4M			8.0	μs
t_r	Rise Time	I_F = 20 mA, V_{CC} = 5 V, R_L = 1 kΩ	CNY171M/F1M			4.0	μs
		I_F = 10 mA, V_{CC} = 5 V, R_L = 1 kΩ	CNY172M/3M/4M CNY17F2M/F3M/F4M			6.0	μs
t_s	Storage Time	I_F = 20 mA, V_{CC} = 5 V, R_L = 1 kΩ	CNY171M/F1M			34.0	μs
		I_F = 10 mA, V_{CC} = 5 V, R_L = 1 kΩ	CNY172M/3M/4M CNY17F2M/F3M/F4M			39.0	μs
t_f	Fall Time	I_F = 20 mA, V_{CC} = 5 V, R_L = 1 kΩ	CNY171M/F1M			20.0	μs
		I_F = 10 mA, V_{CC} = 5 V, R_L = 1 kΩ	CNY172M/3M/4M CNY17F2M/F3M/F4M			24.0	μs

ISOLATION CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
VISO	Input−Output Isolation Voltage	t = 1 Minute	4170			VAC_{RMS}
CISO	Isolation Capacitance	V_{I-O} = 0 V, f = 1 MHz		0.2		pF
RISO	Isolation Resistance	V_{I-O} = ±500 VDC, T_A = 25°C	10^{11}			Ω

TYPICAL PERFORMANCE CHARACTERISTICS

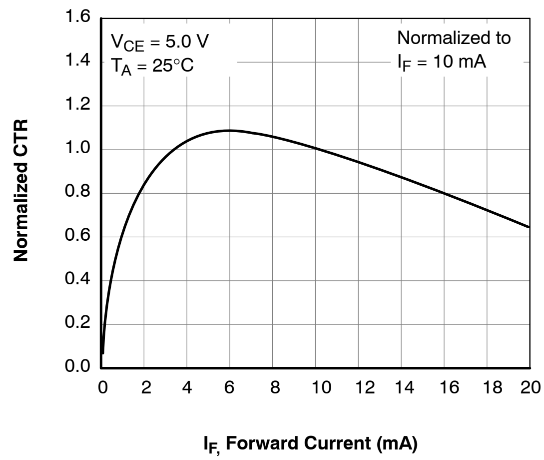


Figure 2. Normalized CTR vs. Forward Current

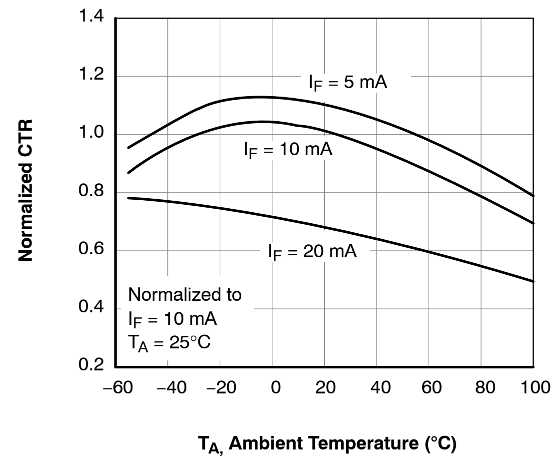


Figure 3. Normalized CTR vs. Ambient Temperature

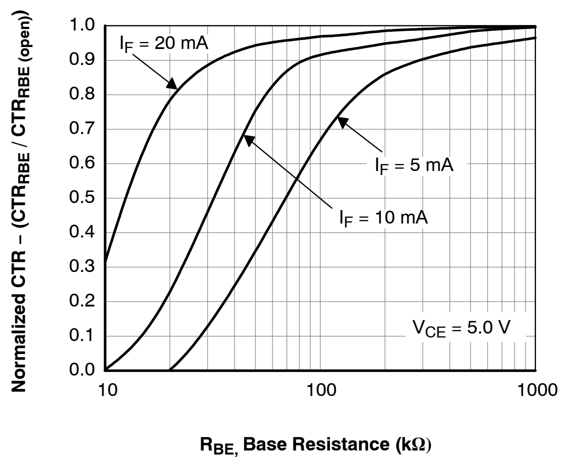


Figure 4. CTR vs. RBE (Unsaturated)

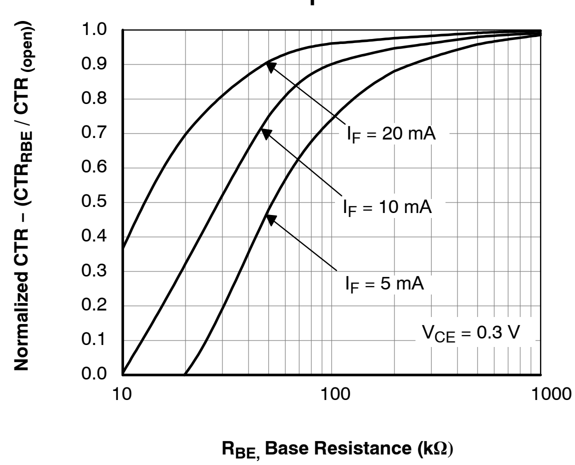


Figure 5. CTR vs. RBE (Saturated)

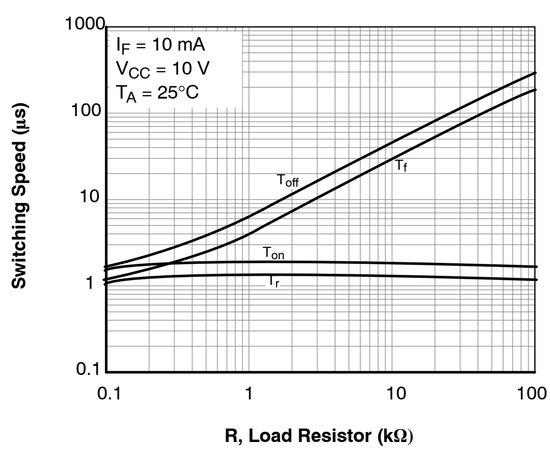


Figure 6. Switching Speed vs. Load Resistor

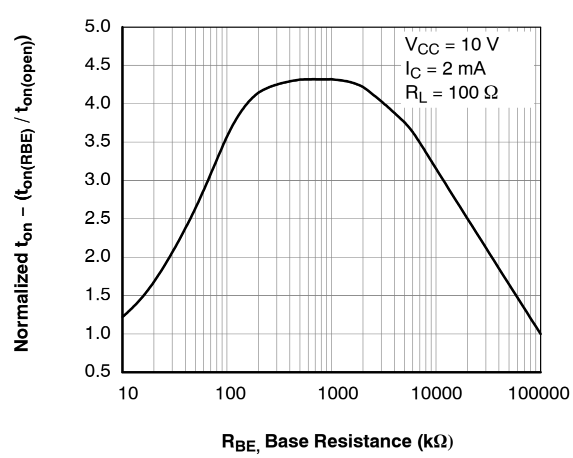


Figure 7. Normalized t_{on} vs. R_{BE}

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

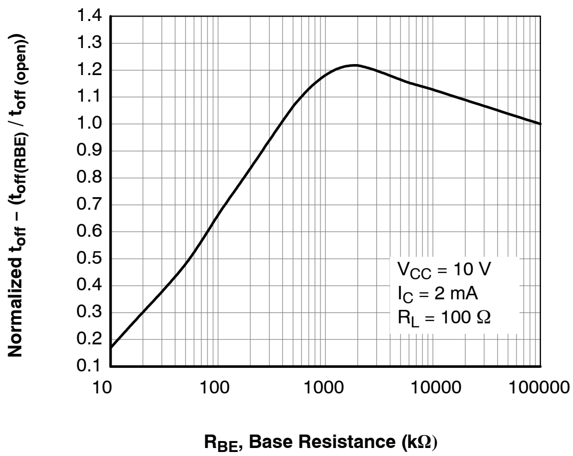


Figure 8. Normalized t_{off} vs. R_{BE}

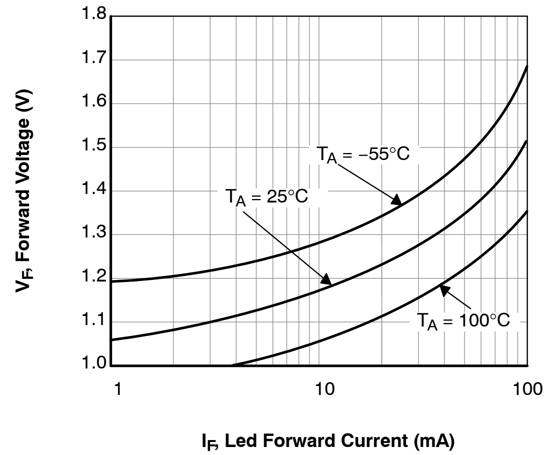


Figure 9. LED Forward Voltage vs. Forward Current

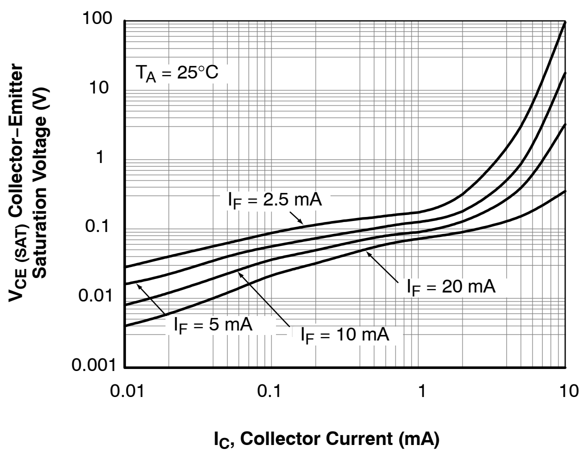


Figure 10. Collector−Emitter Saturation Voltage vs. Collector Current

SWITCHING TEST CIRCUIT AND WAVEFORMS

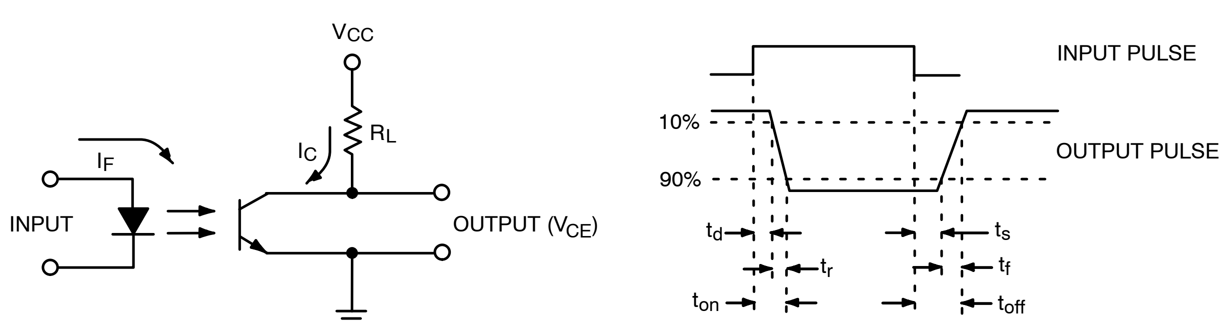


Figure 11. Switching Test Circuit and Waveforms

REFLOW PROFILE

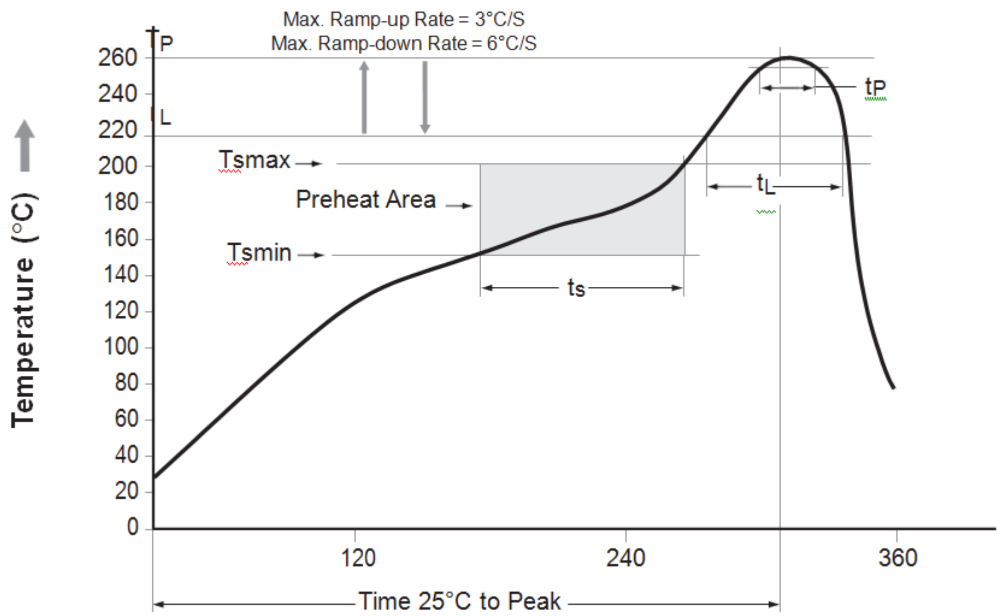


Figure 12. Reflow Profile

Profile Feature	Pb – Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (t_S) from (Tsmin to Tsmax)	60–120 seconds
Ramp – up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60–150 seconds
Peak Body Package Temperature	260°C +0°C / –5°C
Time (t_P) within 5°C of 260°C	30 seconds
Ramp – down Rate (T_P to T_L)	6°C / second max.
Time 25°C to Peak Temperature	8 minutes max.

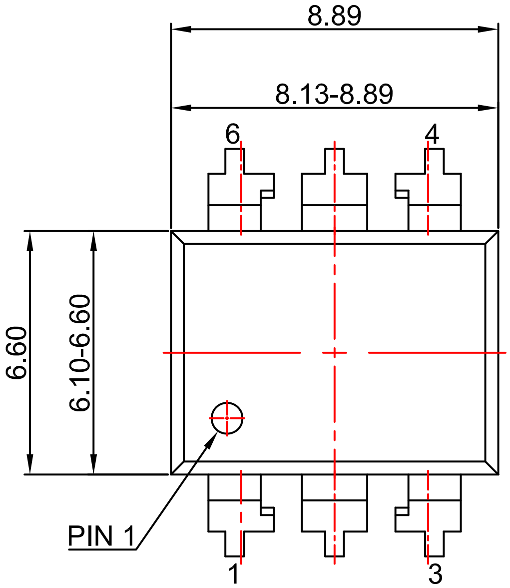
Table 1. ORDERING INFORMATION

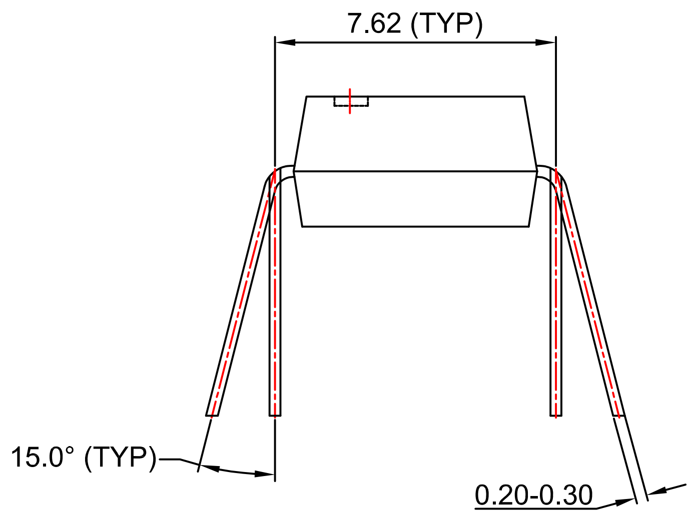
Part Number	Package	Packing Method†
CNY171M	DIP 6–Pin	Tube (50 Units)
CNY171SM	SMT 6–Pin (Lead Bend)	Tube (50 Units)
CNY171SR2M	SMT 6–Pin (Lead Bend)	Tape and Reel (1000 Units)
CNY171TM	DIP 6–Pin, 0.4” Lead Spacing	Tube (50 Units)
CNY171VM	DIP 6–Pin, DIN EN/IEC60747–5–5 Option	Tube (50 Units)
CNY171SVM	SMT 6–Pin (Lead Bend), DIN EN/IEC60747–5–5 Option	Tube (50 Units)
CNY171SR2VM	SMT 6–Pin (Lead Bend), DIN EN/IEC60747–5–5 Option	Tape and Reel (1000 Units)
CNY171TVM	DIP 6–Pin, 0.4” Lead Spacing, DIN EN/IEC60747–5–5 Option	Tube (50 Units)

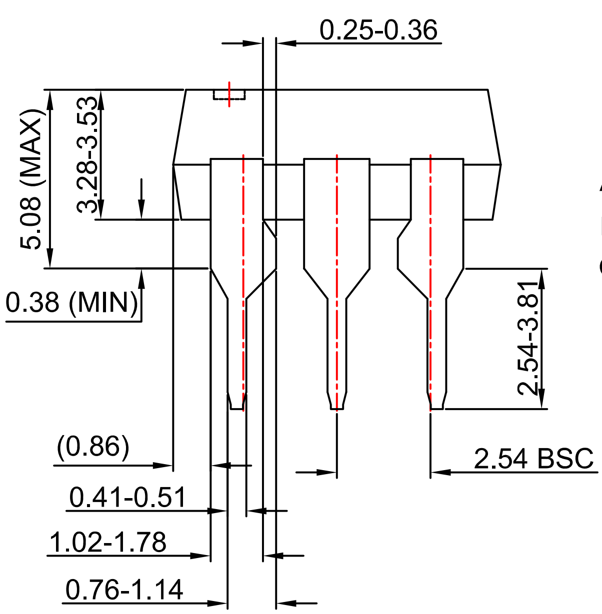
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.
2. The product orderable part number system listed in this table also applies to the CNY17FXM product family and the MOC8106M device.

PDIP6 8.51x6.35, 2.54P
CASE 646BX
ISSUE O

DATE 31 JUL 2016







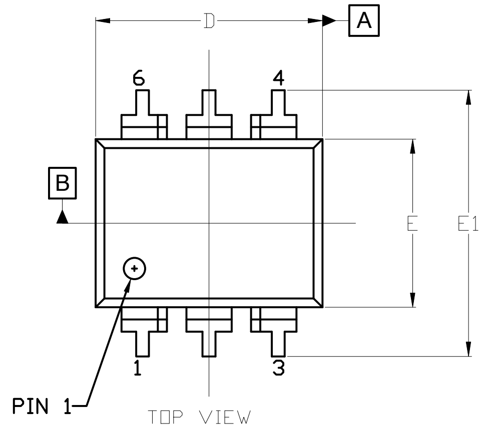
NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSION

DOCUMENT NUMBER:	**98AON13449G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**PDIP6 8.51X6.35, 2.54P**		**PAGE 1 OF 1**

PDIP6 8.51x6.35, 2.54P
CASE 646BY
ISSUE A

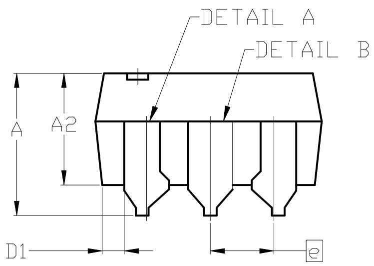
DATE 15 JUL 2019



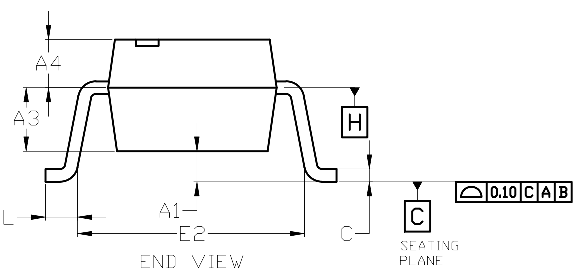
TOP VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS A, A1, AND L ARE MEASURED WITH THE PACKAGE SEATED.
4. DIMENSIONS D, D1, AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS ARE NOT TO EXCEED 2.54mm.
5. PACKAGE CONTOUR IS OPTIONAL (ROUNDED OR SQUARE CORNERS).
6. CENTER LINE OF CORNER LEADS ARE LOCATED BY LOCATING THE CENTER OF FEATURE b2 AND b3.

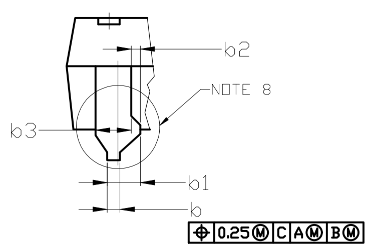
DIM	MILLIMETERS MIN.	MILLIMETERS NOM.	MILLIMETERS MAX.
A	---	---	4.80
A1	0.38	---	---
A2	3.28	3.40	3.53
A3	2.49 REF		
A4	1.89 REF		
b	0.41	0.46	0.51
b1	0.76	0.92	1.14
b2	0.25	0.28	0.36
b3	1.02	1.40	1.78
b4	1.778 REF		
c	0.20	0.25	0.30
D	8.13	8.51	8.89
D1	0.86 REF		
E	6.10	6.35	6.60
E1	8.43	9.17	9.90
E2	8.13 REF		
e	2.54 BSC		
L	0.16	0.52	0.88



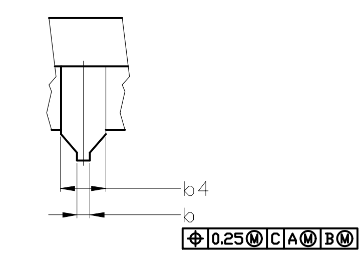
SIDE VIEW



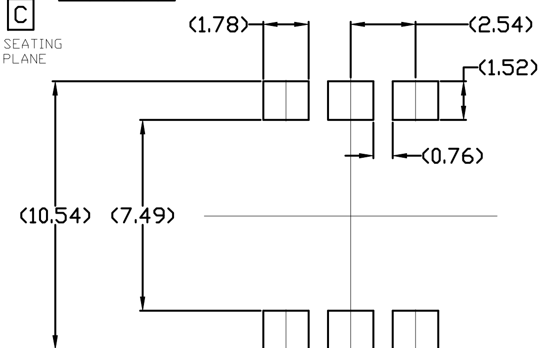
END VIEW



DETAIL A
CORNER LEADS



DETAIL B
MIDDLE LEADS



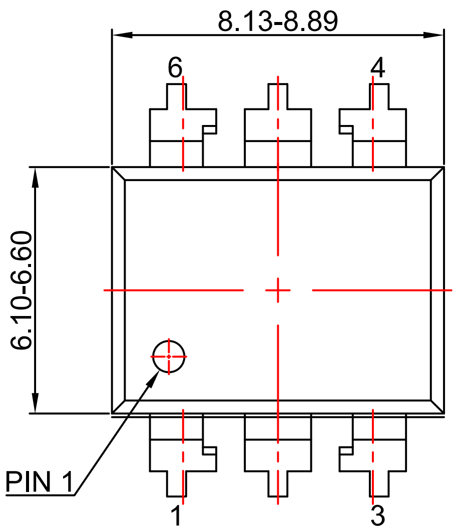
RECOMMENDED MOUNTING FOOTPRINT

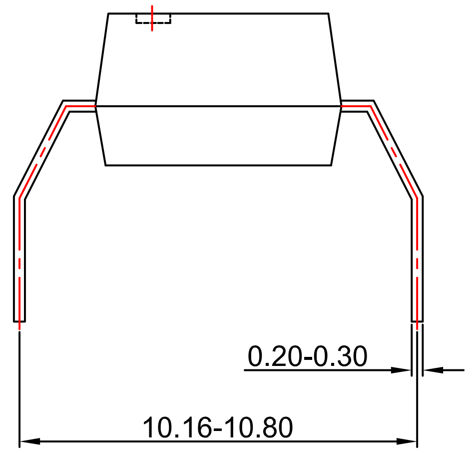
* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

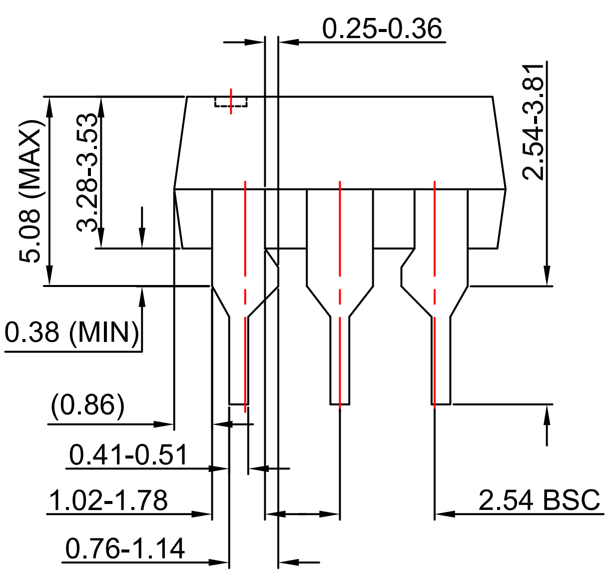
DOCUMENT NUMBER:	**98AON13450G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	**PDIP6 8.51x6.35, 2.54P**	**PAGE 1 OF 1**

PDIP6 8.51x6.35, 2.54P
CASE 646BZ
ISSUE O

DATE 31 JUL 2016







NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSION

DOCUMENT NUMBER:	98AON13451G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	PDIP6 8.51X6.35, 2.54P	PAGE 1 OF 1

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT
North American Technical Support:
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

◊