

6-PIN PHOTOTRANSISTOR OPTOCOUPLEDERS

CNX35U CNX36U CNX38U CNX39U

DESCRIPTION

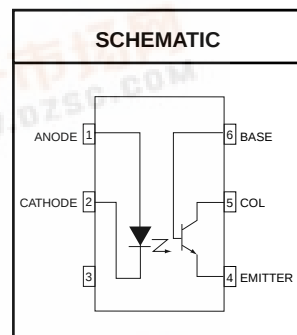
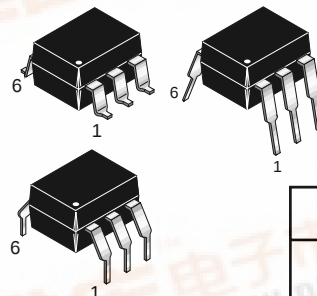
The CNX35U, CNX36U CNX38U and CNX39U are optically coupled isolators consisting of an infrared emitting GaAs diode and a silicon NPN phototransistor with accessible base. These devices are housed in 6-pin dual-in-line packages (DIP).

FEATURES

- High output/input DC current transfer ratio
- Low saturation voltage
- UL recognized (File # E90700)
- VDE recognized (File # 94766)
- Ordering option '300' (e.g. CNX35U.300)

APPLICATIONS

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls



Parameters	Symbol	Device	Value	Units
TOTAL DEVICE				
Storage Temperature	T _{STG}	All	-55 to +150	°C
Operating Temperature	T _{OPR}	All	-40 to +100	°C
Lead Solder Temperature	T _{SOL}	All	260 for 10 sec	°C
EMITTER				
Continuous Reverse Voltage	V _R	All	5	V
Continuous Forward Current	I _F	All	100	mA
Forward Current - Peak (10 μs pulse, δ = 0.01)	I _{F(pk)}	All	3.0	A
Total Power Dissipation up to 25°C Ambient Derate Linearly from 25°C	P _D	All	200	mW
		All	2.0	mW/°C
DETECTOR				
Collector to Emitter Voltage (open base)	V _{CEO}	CNX38U	80	V
		CNX35U, CNX36U, CNX39U	30	
Collector to Base Voltage (open emitter)	V _{CBO}	CNX38U	120	V
		CNX35U, CNX36U, CNX39U	70	
Emitter to Collector Voltage (open base)	V _{ECO}	All	7	V
DC Collector Current	I _C	All	100	mA
Detector Power Dissipation up to 25°C Ambient Derate Linearly from 25°C	P _D	All	200	mW
		All	2.0	mW/°C

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

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameters	Test Conditions	Symbol	Device	Min	Typ	Max	Units
EMITTER							
Input Forward Voltage	I _F = 10 mA	V _F	All		1.15	1.5	V
Reverse Current	V _R = 5 V	I _R	All			10	μA
DETECTOR							
Leakage Current Collector to Emitter	V _{CE} = 10 V	I _{CEO}	CNX35U, CNX36U, CNX39U		2	50	nA
	V _{CE} = 50 V		CNX38U		2	50	nA
	V _{CE} = 10 V, T _A = 70°C		CNX35U, CNX36U, CNX39U			10	μA
	V _{CE} = 50 V, T _A = 70°C		CNX38U			10	μA
	V _{CE} = 10 V	I _{CBO}	All			20	nA
Breakdown Voltage Collector to Emitter	I _C = 1 mA, I _F = 0	BV _{CEO}	CNX35U, CNX36U, CNX39U	30			V
			CNX38U	80			
Collector to Base	I _C = 0.1 mA, I _F = 0	BV _{CBO}	CNX35U, CNX36U, CNX39U	70			V
			CNX38U	120			
Emitter to Collector	I _E = 0.1 mA, I _F = 0	BV _{ECO}	All	7			V

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ	Max	Units
Input-Output Isolation Voltage	t = 1 min.	V _{ISO}	5,300			V _{RMS}
Isolation Resistance	V _{I-O} = 500 VDC	R _{ISO}	1	10		TΩ
Isolation Capacitance	I _F = 0, V = 0V, f = 1 MHz	C _{ISO}		0.6	1.3	pF

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

DC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
Output/Input Current Transfer Ratio	$I_F = 10\text{ mA}$, $V_{CE} = 0.4\text{ V}$	CTR	CNX35U	40		160	%
			CNX39U	60		100	
			CNX36U	80		200	
	CNX38U		70		210		
			50				
	$I_F = 10\text{ mA}$, $V_{CE} = 10\text{ V}$						
$I_F = 16\text{ mA}$, $V_{CE} = 0.4\text{ V}$							
	$I_F = 2\text{ mA}$, $V_{CE} = 5\text{ V}$		All	15			
Collector-Emitter Saturation Voltage	$I_F = 10\text{ mA}$, $I_C = 2\text{ mA}$	$V_{CE(SAT)}$	CNX35U, CNX39U		0.15	0.4	V
	$I_F = 10\text{ mA}$, $I_C = 4\text{ mA}$		CNX36U		0.19	0.4	
	$I_F = 16\text{ mA}$, $I_C = 2\text{ mA}$		CNX38U		0.2	0.4	
AC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
Non-Saturated Switching Times							
Turn-On Time See Fig. 1 and Fig. 2	$R_L = 100\text{ }\Omega$, $I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$	t_{on}	CNX35U			20	μs
			CNX39U			20	
	$R_L = 100\text{ }\Omega$, $I_C = 4\text{ mA}$, $V_{CC} = 5\text{ V}$		CNX36U			20	
			CNX38U			20	
Turn-Off Time See Fig. 1 and Fig. 2	$R_L = 100\text{ }\Omega$, $I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$	t_{off}	CNX35U			20	μs
			CNX39U			20	
			CNX36U			20	
			CNX38U			20	
Saturated Switching Times							
Turn-On Time See Fig. 1 and Fig. 2	$R_L = 1\text{ k}\Omega$, $I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$	t_{on}	CNX35U			50	μs
			CNX39U			50	
			CNX36U			50	
	$R_L = 1\text{ k}\Omega$, $I_C = 4\text{ mA}$, $V_{CC} = 5\text{ V}$		CNX38U			50	
Turn-Off Time See Fig. 1 and Fig. 2	$R_L = 1\text{ k}\Omega$, $I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$	t_{off}	CNX35U			50	μs
			CNX39U			50	
			CNX36U			50	
	$R_L = 1\text{ k}\Omega$, $I_C = 4\text{ mA}$, $V_{CC} = 5\text{ V}$		CNX38U			50	

CNX35U CNX36U CNX38U CNX39U

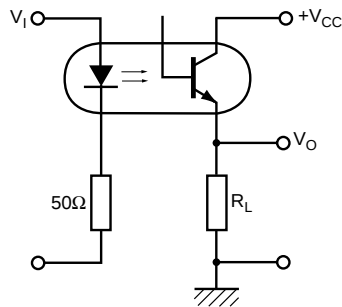


Fig. 1 Switching Test Circuit

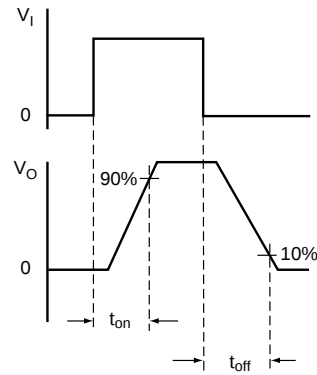


Fig. 2 Switching Test Waveforms

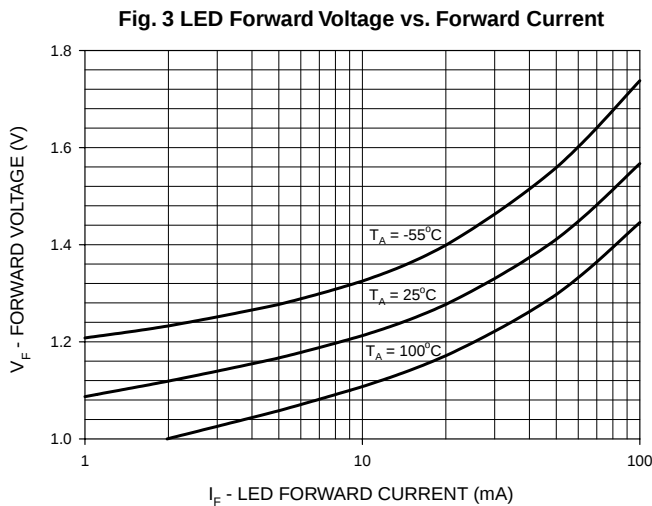


Fig. 3 LED Forward Voltage vs. Forward Current

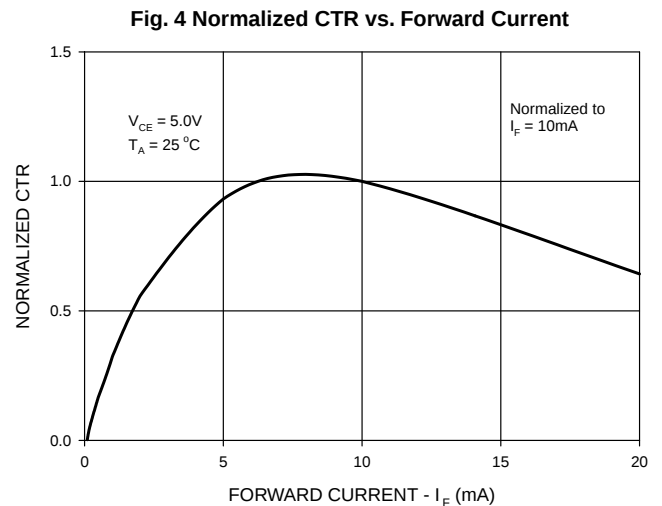


Fig. 4 Normalized CTR vs. Forward Current

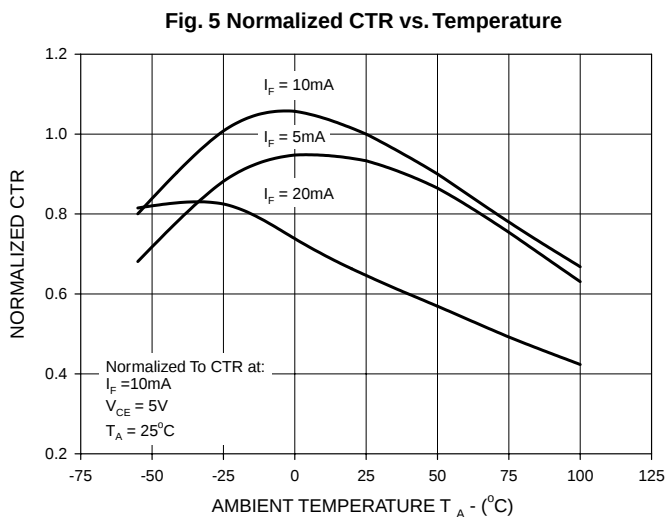


Fig. 5 Normalized CTR vs. Temperature

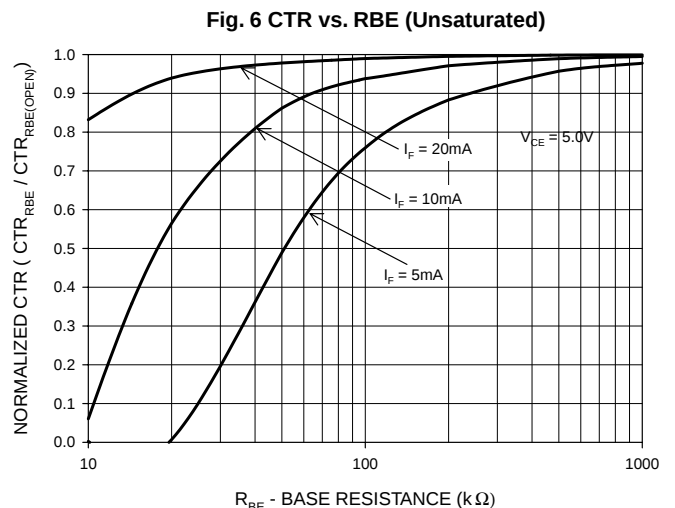


Fig. 6 CTR vs. RBE (Unsaturated)

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Fig. 7 CTR vs. R_{BE} (Saturated)

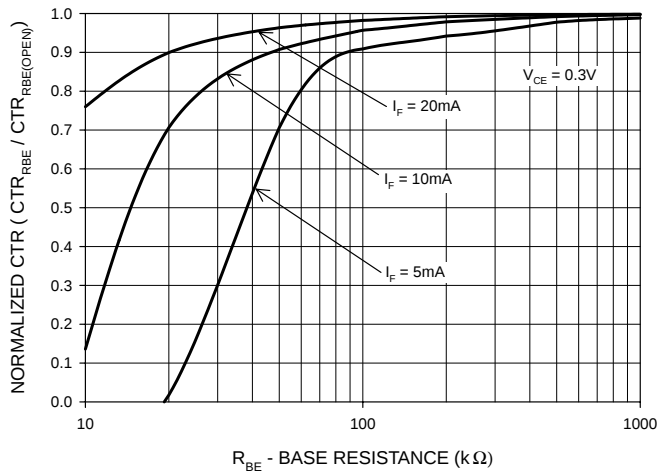


Fig. 8 Normalized t_{on} vs. R_{BE}

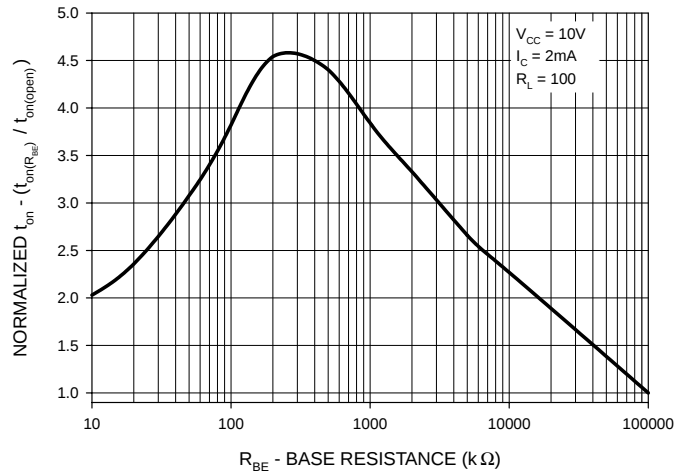


Fig. 9 Normalized t_{off} vs. R_{BE}

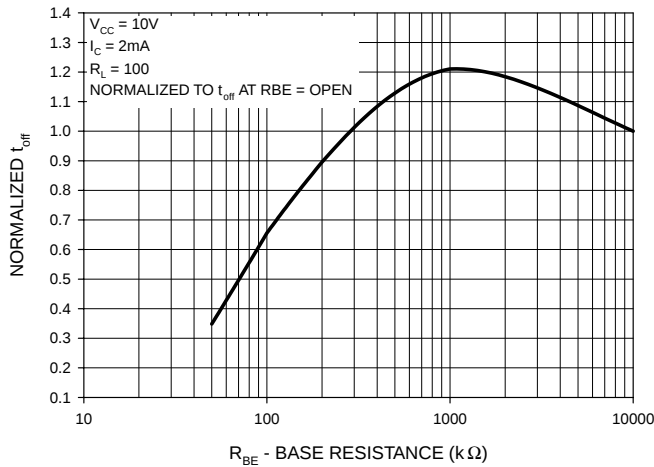
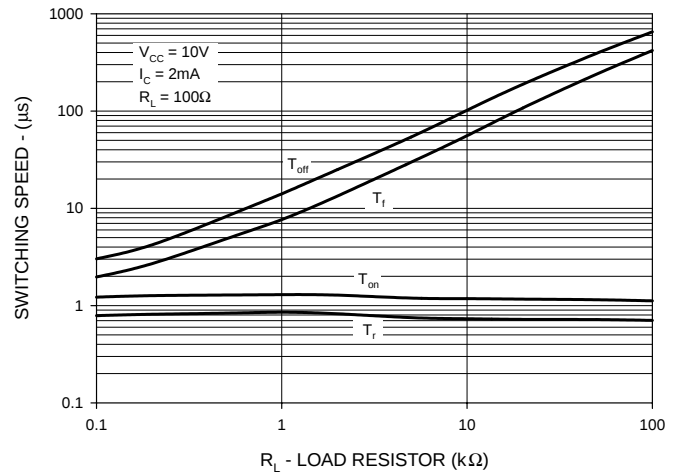
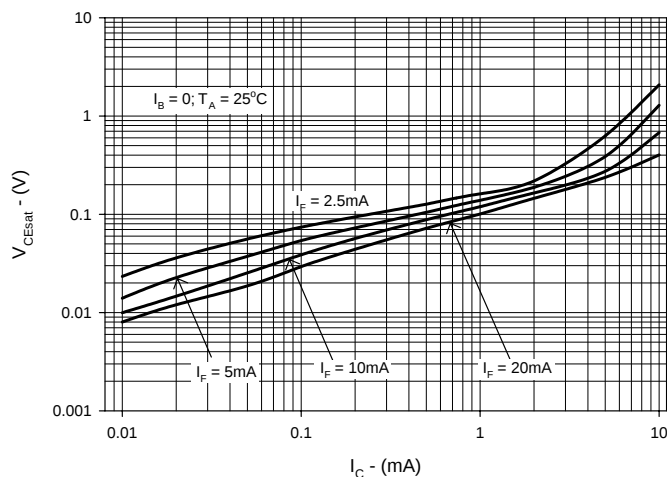


Fig. 10 Switching Speed vs. Load Resistor



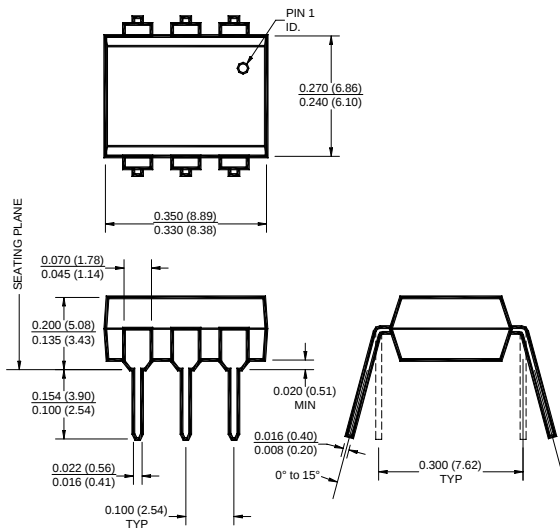
**Fig. 11 Collector-Emitter Saturation Voltage
as a Function of Collector Current**



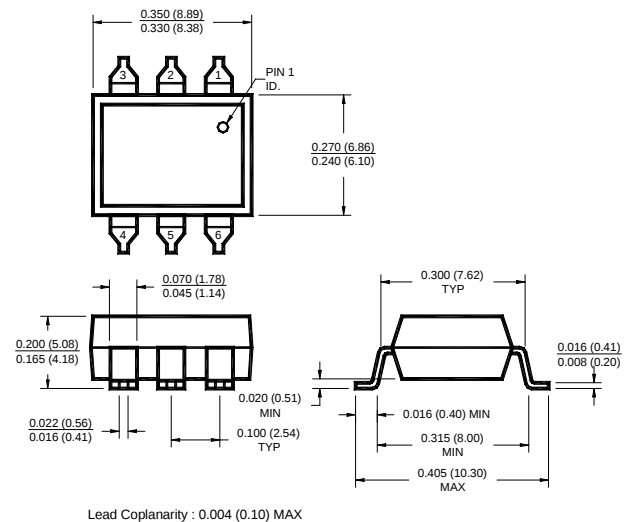
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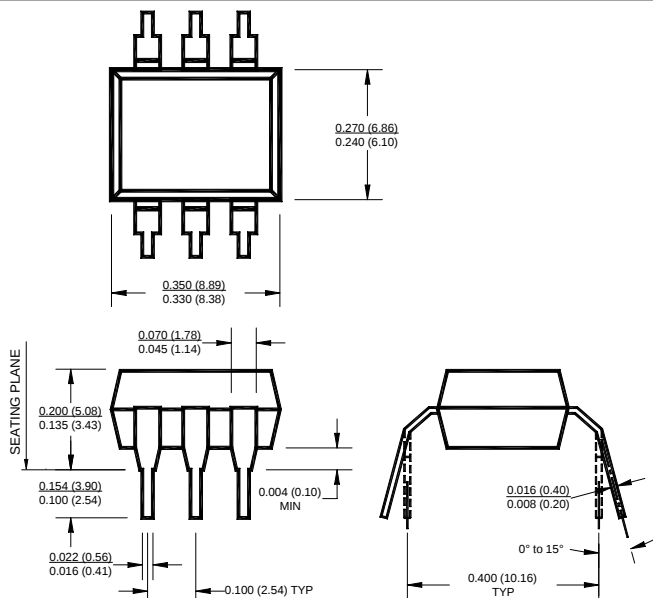
Package Dimensions (Through Hole)



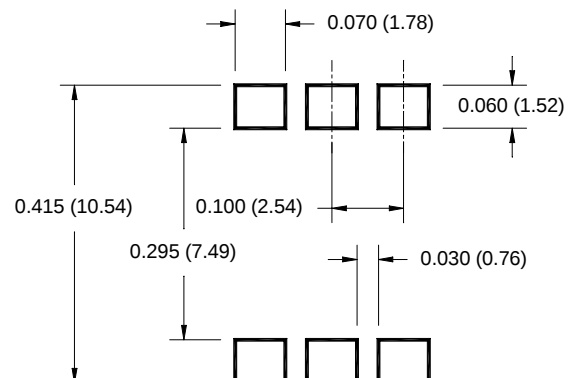
Package Dimensions (Surface Mount)



Package Dimensions (0.4"Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

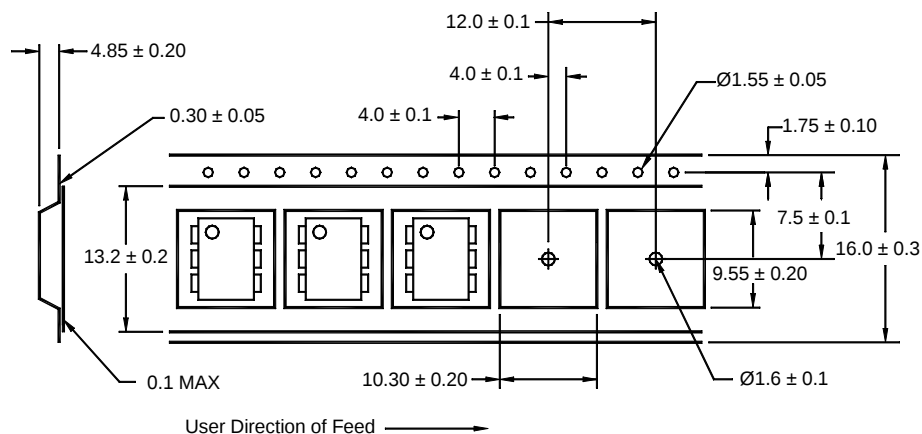
All dimensions are in inches (millimeters)

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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 & Reel

Carrier Tape Specifications ("D" Taping Orientation)



NOTE

All dimensions are in inches (millimeters)

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