



Corning® Varioptic® D-u-39N0-160 Microscope Auto Focus Module

Overview

The Corning® Varioptic® D-u-39N0-160 microscope auto focus module is based on an inverted and modified Corning® Varioptic® C-C-39N0-160 auto focus lens module that, when used with specific extension rings for C-mount, can build an inexpensive auto focus microscope. It incorporates the necessary electronic components to drive the lens and only needs a DC power supply. Focus can be controlled through either an RS232, I2C, Analog, or SPI input. For more information on this module, please refer to the D-u-39N0-160 Technical Datasheets (TEDS).

Ordering Information

Corning® Varioptic® D-u-39N0-160-XX microscope auto focus lens module where **XX** determines objective lens configuration:

- **Corning® Varioptic® D-u-39N0-160-I2C microscope auto focus module:** I2C or analog operation.
- **Corning® Varioptic® D-u-39N0-160-R33 microscope auto focus module:** RS232 with 3.3 V signal or analog operation.
- **Corning® Varioptic® D-u-39N0-160-R12 microscope auto focus module:** RS232 with 12 V signal or analog operation.
- **Corning® Varioptic® D-u-39N0-160-SPI microscope auto focus module:** SPI operation only.

Performance Summary

- | | |
|--------------------|------------------------|
| • Magnification | x3.4 to x6.4
Custom |
| • Working distance | 15 mm to 13 mm |
| • Focusing range | ± 2 mm |
| • Back focus range | 17.5 mm to 67.5 mm |



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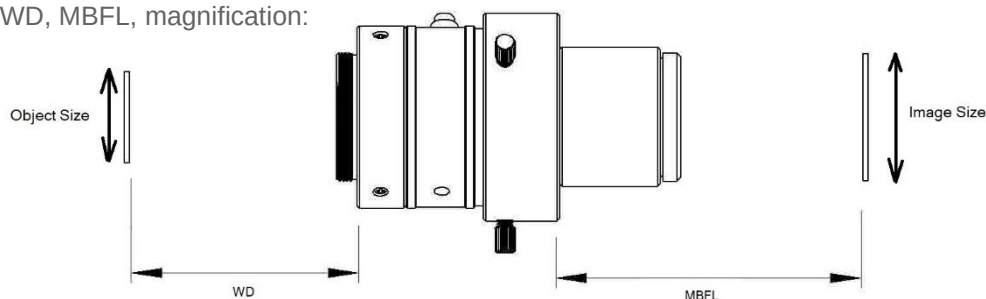
Opto-Electrical Performance

Performances described below are for 25°C.

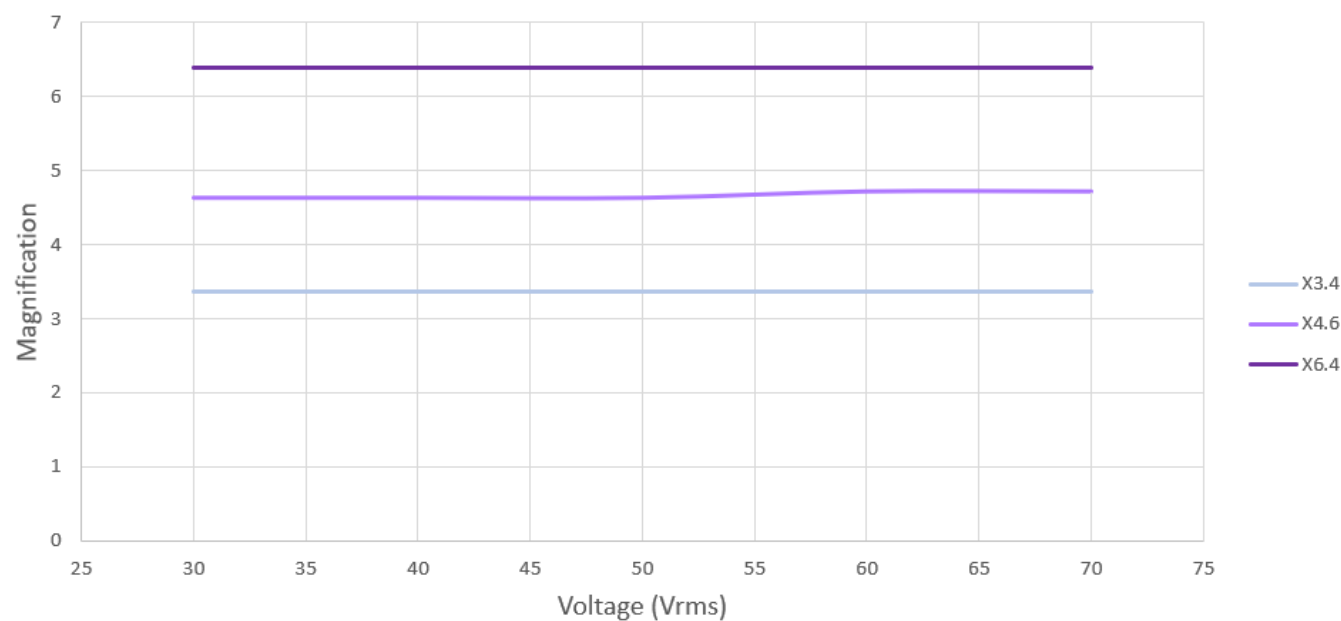
Optical Performances	Symbol	Min	Typ	Max	Unit	Notes
Voltage for nominal magnification	V_N	49	50	51	V	(1)
Nominal recommended magnification with tubes available in the kit	α_N	X3.4		X6.4	-	(2)
Mechanical Back Focal Length (MBFL)						
X3.4	MBFL ₃		17.5		mm	(3)
X4.6	MBFL ₄		37.5		mm	
X6.4	MBFL ₆		67.5		mm	
Working Distance (WD)						
X3.4	WD ₃		15		mm	(3)
X4.6	WD ₄		14		mm	
X6.4	WD ₆		13		mm	
F- number	F#		2.8		-	
Maximum object diagonal in the field			3.7		mm	
Object resolution for pixel resolution			2.2		μm	
Focus control performances						
Minimum voltage	V_L		38		V	
Maximum voltage	V_H		62		V	
Working distance range						
X3.4	ΔWD_3		4		mm	(3)
X4.6	ΔWD_4		4		mm	
X6.4	ΔWD_6		4		mm	

Notes:

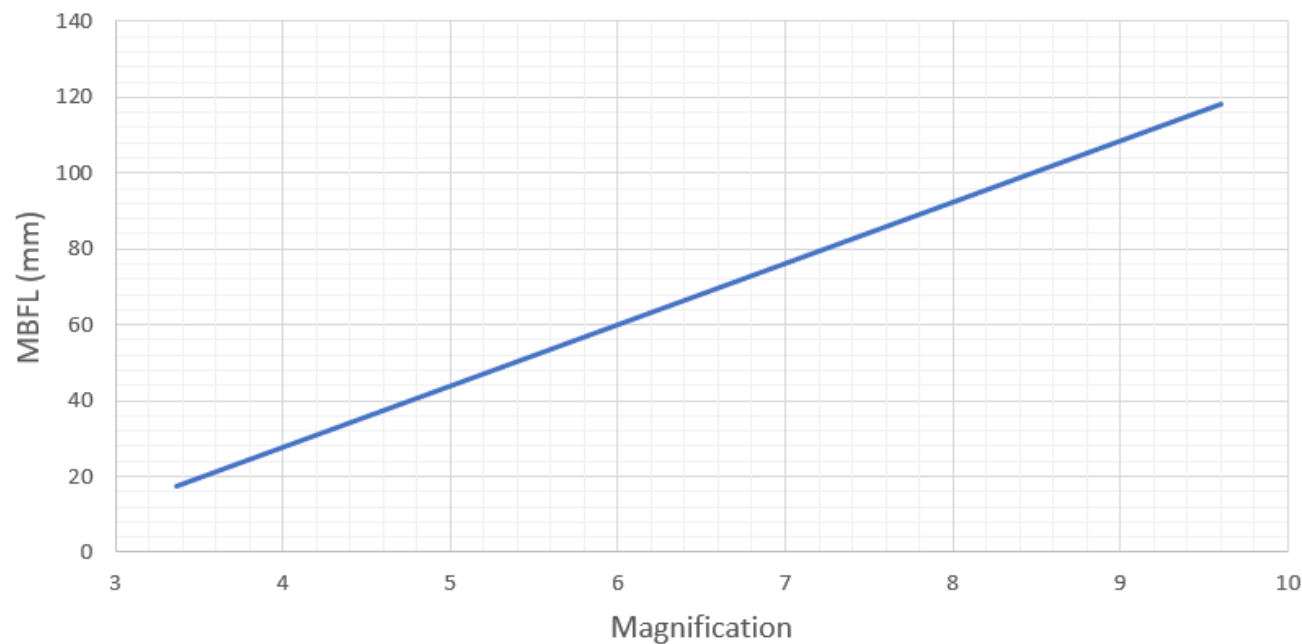
- (1) Voltage for nominal magnification is for an optical power on the adjustable lens of 4 diopters, which is in the middle of the optical range [-5 D..+13 D], however a +/-5% tolerance on the magnification can be observed.
- (2) Magnification is the ratio between the image size and the object size. Magnification may slightly change with focus.
- (3) Definitions of WD, MBFL, magnification:



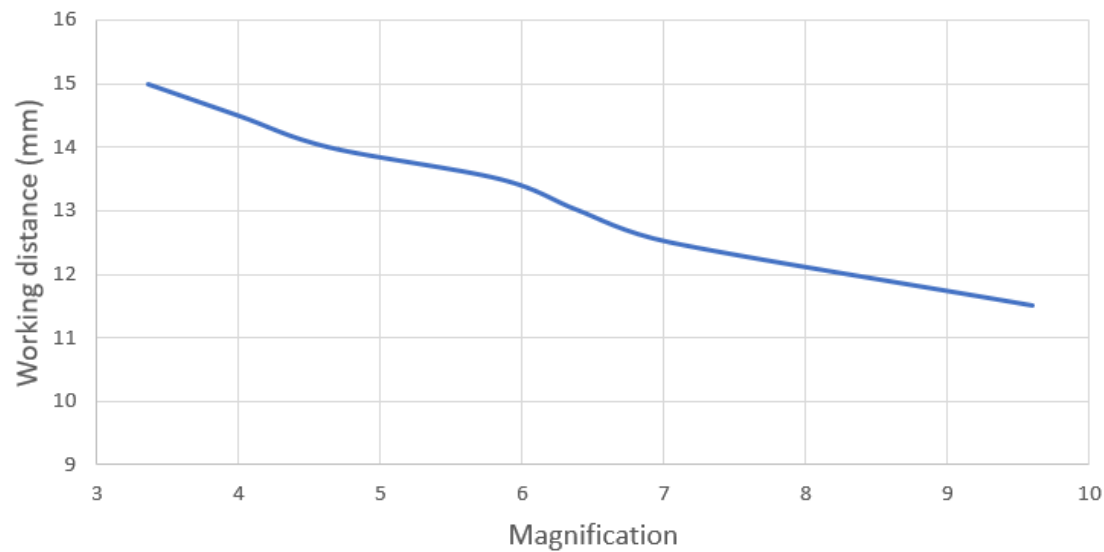
Magnification versus Voltage



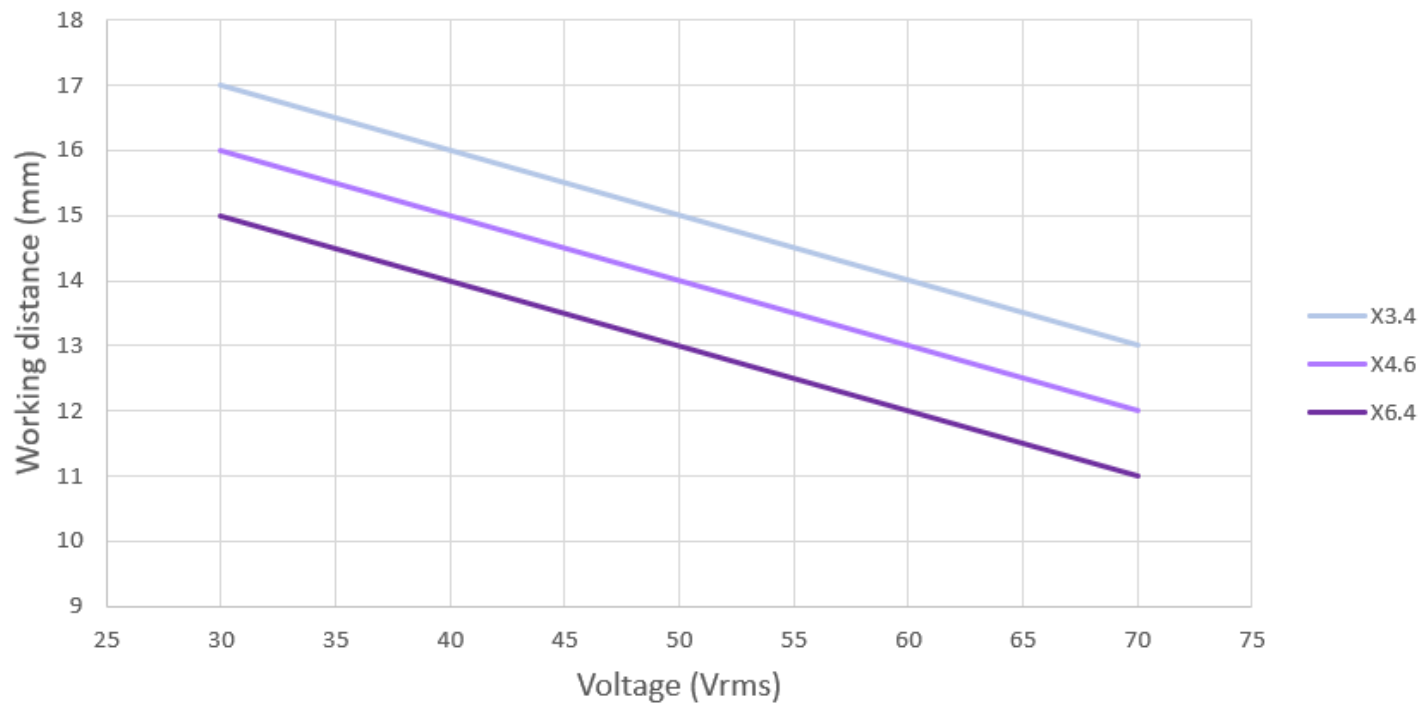
Mechanical Back Focal Length (MBFL) versus Nominal Magnification



Working Distance (WD) versus Nominal Magnification



Working Distance (WD) versus Voltage



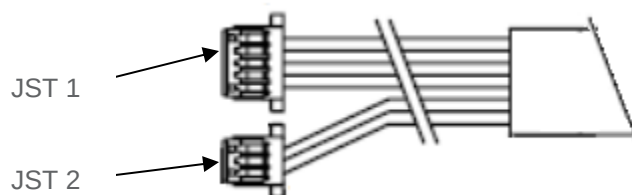
Electrical Connection

The C-u-module has a 6-pin connector for power and control (JST_1).

Connector reference: JST SHR-06V-S-B

Wire reference: JST SH3-SH3-28300

These pins have different functions depending on the module version.



Communication Terminal JST_1

Pin	Name	Description
1	VIN	Positive power supply (+3.3 to +24 VDC/ red wire)
2	GND	Ground (black wire)
3	I2Csd_a_Rx_SDI	Multipurpose pin (depending on the part/ yellow wire)
4	I2Csc_l_Rx_SCK	Multipurpose pin (depending on the part/ blue wire)
5	SDO_Ana	Multipurpose pin (depending on the part)
6	MCLR	Programming pin (must be unconnected)

The function of the multipurpose pins depends on the part number:

C-C-39N0-250-					
Pin	Name	R12	R33	SPI	I2C
3	I2Csd_a_Rx_SDI	Rx (RS232)	Rx (3.3V)	SDI	SDA
4	I2Csc_l_Tx_SCK	Tx (RS232)	Tx (3.3V)	SCK	SCL
5	SDO_Ana	Analog input	Analog input	SDO	Analog input

Programming Terminal JST_2

Pin	Name	R12	R33	SPI	I2C
1	ICSPDAT	Rx (RS232)	Rx (3.3V)	SDI	SDA
2	ICSPCLK	Tx (RS232)	Tx (3.3V)	SCK	SCL
3	MCLR	Analog input	Analog input	SDO	Analog input

Electrical Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Power supply						
Input voltage	V _{cc}	3.3	5	24	V	
Current consumption - Active mode	I _{cc}		50		mA	(1)
Current consumption – Standby mode	I _{cc Stb}		12		mA	
Control voltage						
R12						
I2Csda_Rx_SDI / I2Cscl_Rx_SCK pins		-25		25	V	(2)
R33/I2C/SPI						
I2Csda_Rx_SDI / I2Cscl_Rx_SCK pins		-0.3		3.6	V	(2)
SDO_Ana pin		-0.3		3.6	V	(2)
MCLR pin		-0.3		3.6	V	

Notes:

- (1) Current consumption depends on the voltage applied on the lens. Value given for 4.5 V power supply. See below chart for more details.

Typical current consumption I_{cc} (mA)

Driver state and voltage applied		(standby)	25 V	70 V
Power supply	3.3 V	16.4	70	100
	4.5 V	12	50	71
	12 V	4.5	27	34
	24 V	2.2	20	23

- (2) Absolute maximum ratings.

Analog Control

Corning® Varioptic® C-C-39N0-160 modules, except for the SPI version, can be controlled by an analog voltage. In this case, the voltage seen by the lens is given by the following equation:

$$V_{rms} = (V_a * 22.5) + 24 \quad \text{with } 0 \text{ V} < V_a < 2 \text{ V}$$

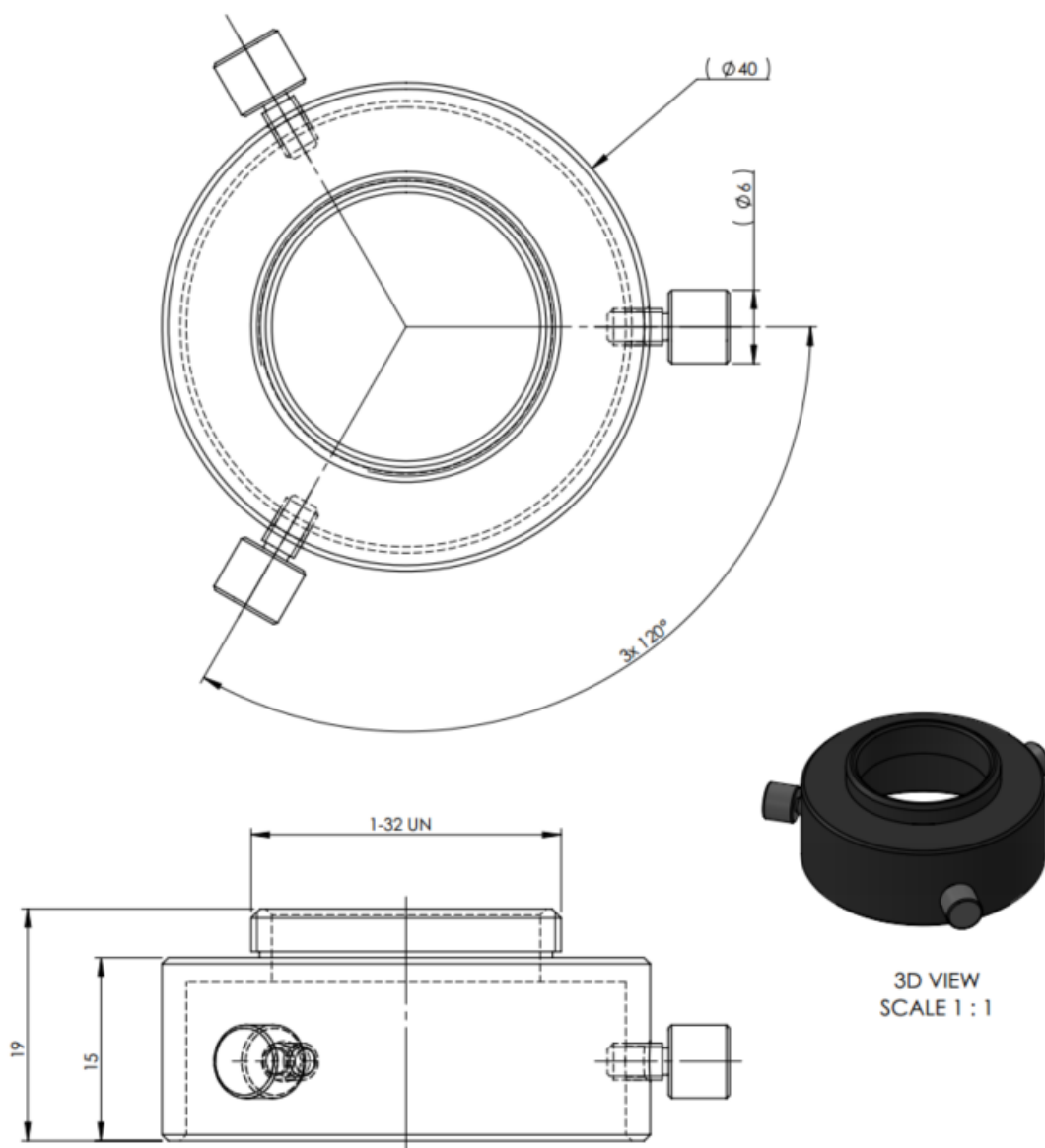
With:

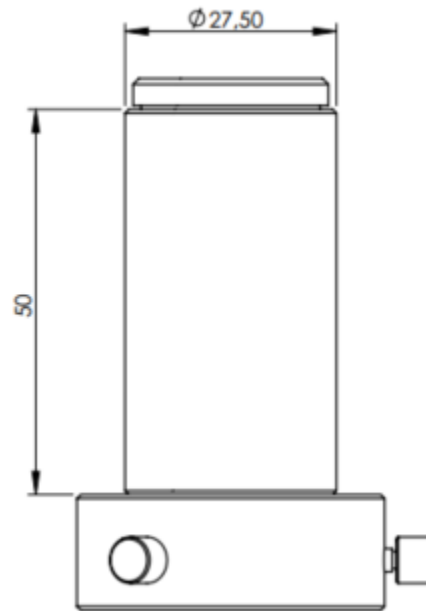
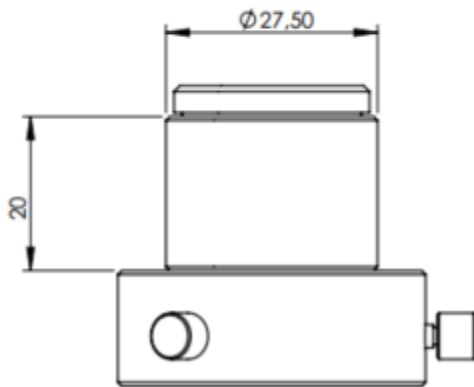
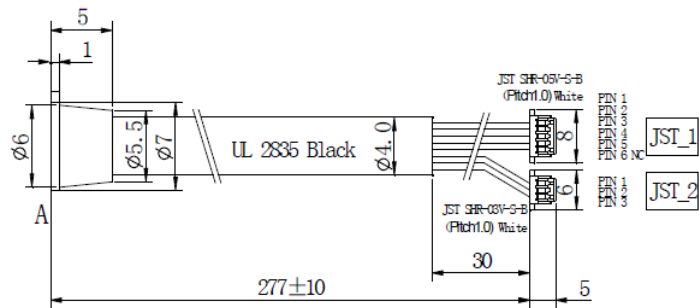
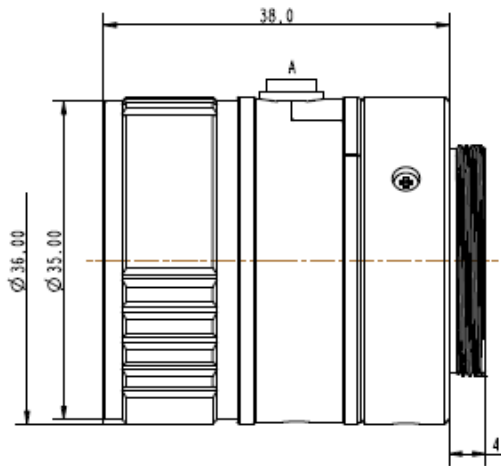
- V_{rms} : rms value of the voltage seen by the lens (AC voltage)
- V_a : analog input voltage (DC voltage)

Temperature Range

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Operating Temperature	T	0	25	50	°C	
Storage Temperature	T _{stg}	-40	25	85	°C	

Mechanical Dimensions





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Marketing Datasheet