Coaxial

Coaxial-Ceramic Resonator Filters and Multiplexers

50Ω DC to 6 GHz

The Big Deal

- Low insertion loss with excellent power handling
- Passbands up to 6 GHz
- Fractional bandwidth from <1 to 25%
- Excellent temperature stability
- Rugged construction to handle demanding environmental conditions

Product Overview

Mini-Circuits' *Coaxial-Ceramic Resonator filters* offer low insertion loss in very small form factors, using ceramic material with high dielectric constant and superior Q factor. Bandpass and bandstop filters,diplexer and multiplexer designs can be constructed using this technology. Low insertion loss combined with excellent power handling makes these filters well suited for transmitter and receiver signal chains. Advanced filter design and construction can achieve stopband width greater than 3x the center frequency

All our coaxial-ceramic resonator filters are built with rugged construction. Excellent repeatability across units is achieved through precise tuning and process control.

Key Features

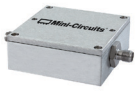
Feature	Advantages
Low insertion loss	Low signal loss results in better SNR in signal chain
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stop band	Wide spur-free stopband results in better receiver sensitivity
Excellent power handling	Well suited for transmitter applications
Rugged Construction	These filter assemblies have been qualified over a wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles
Small Size	Very well suited for high performance applications where size is a constraint.
Temperature stability	Very minimal change in electrical performance across temperature makes these filters suitable for a wide range of operating conditions.

Coaxial

Bandpass Filter

ZCBP6-416R5-S+

50Ω 403 to 430 MHz



Generic photo used for illustration purposes only
CASE STYLE: CC1764

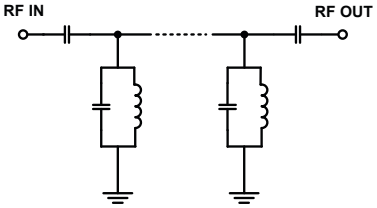
Features

- Low insertion loss, 1.1dB typ.
- High rejection, 70dB typ.
- Connectorized package

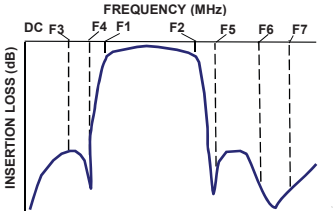
Applications

- Public safety communication
- Medical radio communication service

Functional Schematic



Typical Frequency Response



+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Electrical Specifications at 25°C

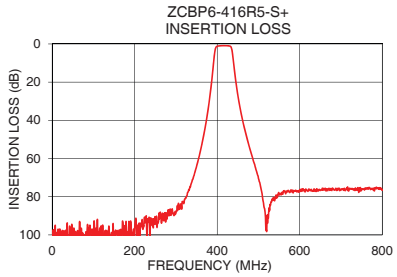
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	416.5	—	MHz
	Insertion Loss	F1-F2	403 - 430	—	1.11	1.7	dB
	VSWR	F1-F2	403 - 430	—	1.23	1.67	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 320	65	80	—	dB
		F3-F4	320 - 382	20	27	—	dB
Stop Band, Upper	Insertion Loss	F5-F6	451 - 520	20	28	—	dB
		F6-F7	520 - 800	55	73	—	dB

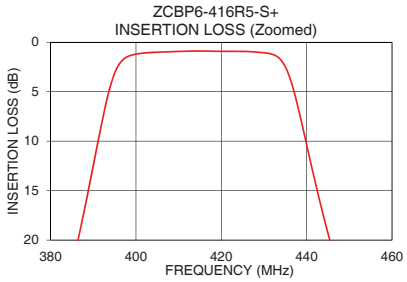
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input*	20W at 25°C

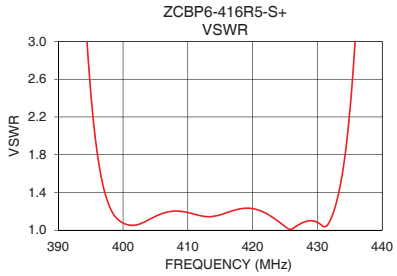
Permanent damage may occur if any of these limits are exceeded.
*Passband rating

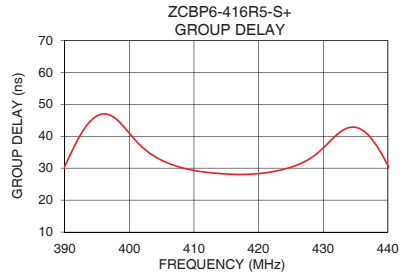
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nSec)
0.5	113.14	10528.35	403.0	34.90
10.5	99.30	6363.29	404.0	33.55
100.5	106.80	1670.36	405.0	32.47
150.5	98.24	883.61	406.0	31.56
320.0	82.56	163.95	407.0	30.82
380.0	31.19	45.89	408.0	30.21
382.0	27.98	39.86	409.0	29.70
395.0	3.12	2.47	410.0	29.29
403.0	1.05	1.08	411.0	28.96
410.0	0.93	1.19	412.0	28.69
416.5	0.90	1.20	413.0	28.47
420.0	0.92	1.23	414.0	28.31
430.0	1.07	1.08	415.0	28.17
436.0	3.53	3.21	416.5	28.07
451.0	28.10	67.81	417.0	28.05
455.0	33.00	85.86	418.0	28.07
520.0	98.12	156.55	420.0	28.30
600.0	76.28	149.40	425.0	30.31
700.0	76.56	125.39	428.0	33.08
800.0	76.62	109.67	430.0	36.34







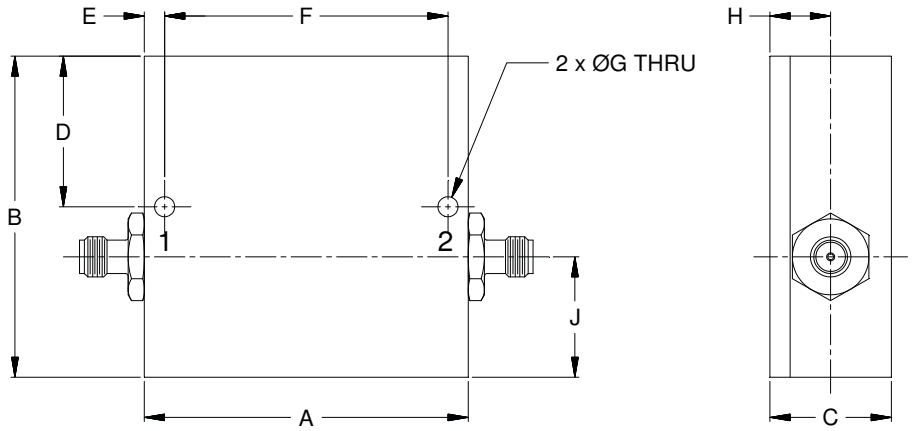


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

Coaxial Connections

PORT - 1	SMA-FEMALE
PORT - 2	SMA-FEMALE

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E
2.000	**2.000**	**.750**	**.938**	**.125**
50.80	50.80	19.05	23.83	3.18

F	G	H	J	Wt.
1.750	**.125**	**.375**	**.750**	grams
44.45	3.18	9.53	19.05	116

Note: Please refer to case style drawing for details

Coaxial Band Pass Filter ZCBP6-416R5-S+

Typical Performance Data

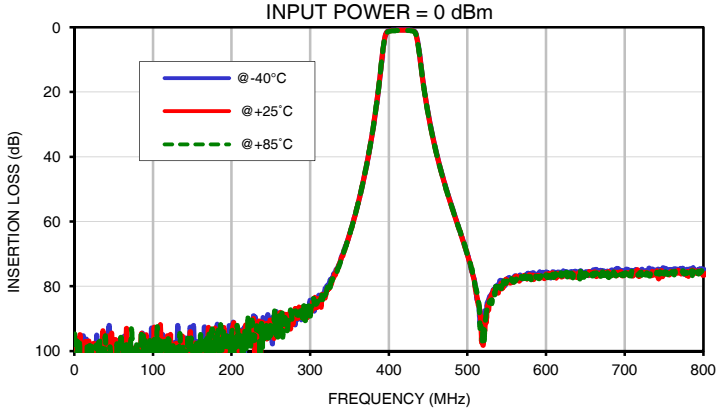
FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
0.5	95.01	113.14	94.75	0.00	0.00	0.00	0.01	0.00	0.01
10.5	96.82	99.30	105.04	0.01	0.00	0.00	0.01	0.01	0.01
20.5	107.49	110.77	102.44	0.01	0.00	0.00	0.01	0.01	0.01
30.5	97.93	105.90	96.57	0.01	0.00	0.00	0.01	0.01	0.01
50.5	96.94	104.27	116.33	0.01	0.01	0.01	0.01	0.01	0.01
100.5	105.77	106.80	99.14	0.01	0.01	0.01	0.01	0.01	0.02
120.5	109.59	102.63	96.56	0.01	0.01	0.02	0.01	0.01	0.02
150.5	99.43	98.24	98.30	0.01	0.02	0.03	0.02	0.03	0.03
200.0	98.69	96.60	95.07	0.02	0.04	0.05	0.03	0.04	0.05
210.0	96.61	96.33	96.46	0.02	0.04	0.05	0.03	0.04	0.05
220.0	95.16	97.07	95.98	0.03	0.05	0.05	0.04	0.05	0.06
230.0	89.78	103.33	93.86	0.03	0.05	0.06	0.04	0.05	0.06
240.0	89.67	92.60	93.15	0.03	0.05	0.06	0.04	0.06	0.07
250.0	90.54	92.97	96.28	0.04	0.06	0.07	0.05	0.06	0.07
260.0	90.43	91.58	89.15	0.05	0.06	0.07	0.06	0.07	0.08
270.0	91.28	92.54	91.36	0.05	0.07	0.08	0.06	0.08	0.09
280.0	89.33	88.69	88.89	0.06	0.07	0.08	0.07	0.08	0.09
300.0	84.33	87.68	89.28	0.07	0.09	0.10	0.08	0.09	0.11
320.0	81.66	82.56	82.24	0.08	0.11	0.12	0.09	0.11	0.13
350.0	64.06	64.15	64.12	0.12	0.15	0.17	0.13	0.15	0.17
360.0	55.34	55.35	55.35	0.15	0.18	0.20	0.16	0.18	0.20
370.0	44.78	44.71	44.66	0.20	0.24	0.26	0.21	0.23	0.26
380.0	31.38	31.19	31.13	0.33	0.38	0.42	0.31	0.35	0.39
382.0	28.18	27.98	27.91	0.37	0.44	0.48	0.36	0.40	0.44
386.0	21.05	20.80	20.70	0.56	0.64	0.70	0.51	0.58	0.63
395.0	3.15	3.12	3.13	6.81	7.45	7.97	6.27	6.84	7.28
400.0	1.09	1.20	1.29	28.68	28.75	29.16	26.52	27.63	28.71
403.0	0.94	1.05	1.14	31.16	28.54	27.05	33.77	30.39	28.57
405.0	0.90	1.01	1.10	24.42	23.32	22.29	24.83	23.76	22.72
408.0	0.86	0.96	1.05	20.90	20.70	20.01	21.50	21.39	20.69
410.0	0.83	0.93	1.01	21.17	21.34	20.82	22.29	22.67	22.15
416.5	0.80	0.90	0.97	21.42	20.93	20.87	22.41	21.86	21.92
418.0	0.81	0.91	0.98	20.37	19.88	19.67	20.81	20.27	20.13
420.0	0.81	0.92	1.00	20.17	19.77	19.37	20.21	19.77	19.41
425.0	0.82	0.92	1.00	33.66	34.12	31.18	29.44	29.09	27.91
430.0	0.94	1.07	1.15	28.40	28.02	28.52	27.15	26.95	27.58
436.0	3.22	3.53	3.58	5.75	5.60	5.83	5.66	5.50	5.73
440.0	9.97	10.37	10.35	1.28	1.31	1.39	1.26	1.28	1.37
446.0	20.61	20.95	20.92	0.36	0.40	0.43	0.36	0.40	0.43
450.0	26.47	26.77	26.75	0.23	0.27	0.30	0.24	0.27	0.30
454.0	31.56	31.84	31.83	0.18	0.21	0.23	0.19	0.22	0.24
459.0	37.13	37.39	37.38	0.14	0.17	0.19	0.15	0.18	0.20
500.0	70.21	70.38	70.29	0.08	0.11	0.13	0.10	0.12	0.13
510.0	80.17	80.55	79.98	0.08	0.11	0.13	0.09	0.12	0.13
520.0	91.94	98.12	92.23	0.08	0.11	0.13	0.10	0.12	0.14
540.0	80.28	81.08	80.27	0.08	0.11	0.13	0.10	0.12	0.14
560.0	76.91	77.21	78.38	0.08	0.12	0.14	0.10	0.12	0.14
580.0	76.45	77.16	77.03	0.08	0.12	0.14	0.10	0.13	0.15
600.0	75.60	76.28	76.46	0.08	0.12	0.14	0.11	0.13	0.15
620.0	76.23	77.15	76.85	0.09	0.12	0.14	0.11	0.13	0.15
640.0	76.05	77.20	76.25	0.09	0.13	0.15	0.11	0.14	0.16
660.0	74.97	76.43	76.54	0.10	0.13	0.15	0.12	0.14	0.16
680.0	75.60	75.68	77.77	0.10	0.13	0.16	0.12	0.15	0.17
700.0	75.74	76.56	76.32	0.11	0.14	0.16	0.13	0.15	0.17
720.0	75.29	75.70	76.30	0.11	0.14	0.16	0.13	0.15	0.18
740.0	75.63	76.52	76.21	0.11	0.15	0.17	0.13	0.16	0.18
760.0	75.13	75.45	75.31	0.11	0.15	0.17	0.14	0.16	0.18
770.0	75.16	75.49	76.34	0.12	0.15	0.17	0.14	0.16	0.19
780.0	75.09	75.50	76.26	0.12	0.15	0.18	0.14	0.17	0.19
800.0	75.29	76.62	76.18	0.12	0.16	0.18	0.14	0.17	0.19

Typical Performance Data

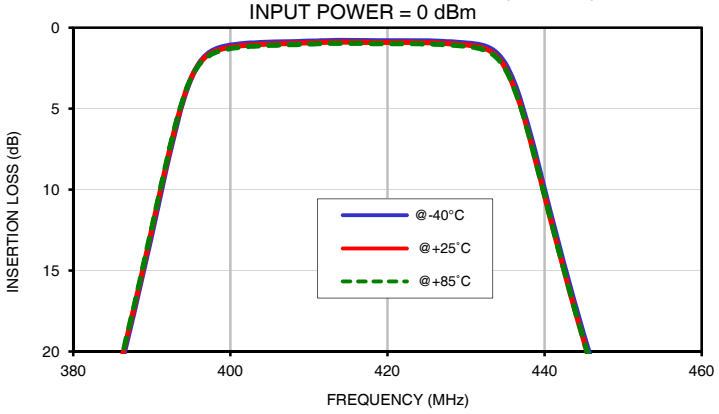
FREQ. (MHz)	GROUP DELAY (ns)		
	@-40°C	@+25˚C	@+85˚C
397.0	46.94	46.62	46.42
398.0	45.78	45.32	45.04
399.0	43.83	43.30	42.97
400.0	41.44	40.92	40.60
401.0	39.04	38.60	38.31
402.0	36.93	36.57	36.33
403.0	35.19	34.90	34.71
404.0	33.78	33.55	33.39
405.0	32.65	32.47	32.32
406.0	31.71	31.56	31.43
407.0	30.95	30.82	30.70
408.0	30.31	30.21	30.10
409.0	29.78	29.70	29.60
410.0	29.35	29.29	29.20
411.0	29.00	28.96	28.88
412.0	28.72	28.69	28.62
413.0	28.50	28.47	28.41
414.0	28.33	28.31	28.25
415.0	28.19	28.17	28.12
416.5	28.08	28.07	28.01
417.0	28.07	28.05	28.00
418.0	28.08	28.07	28.01
419.0	28.15	28.15	28.09
420.0	28.29	28.30	28.23
421.0	28.51	28.54	28.46
422.0	28.80	28.84	28.76
423.0	29.18	29.24	29.16
424.0	29.65	29.72	29.64
425.0	30.21	30.31	30.23
426.0	30.91	31.03	30.94
427.0	31.79	31.93	31.84
428.0	32.90	33.08	32.97
429.0	34.33	34.55	34.42
430.0	36.09	36.34	36.16
431.0	38.09	38.34	38.13
432.0	40.09	40.29	40.06
433.0	41.74	41.85	41.63
434.0	42.75	42.74	42.54
435.0	42.94	42.79	42.64
436.0	42.25	41.97	41.86
437.0	40.68	40.28	40.24

Typical Performance Curves

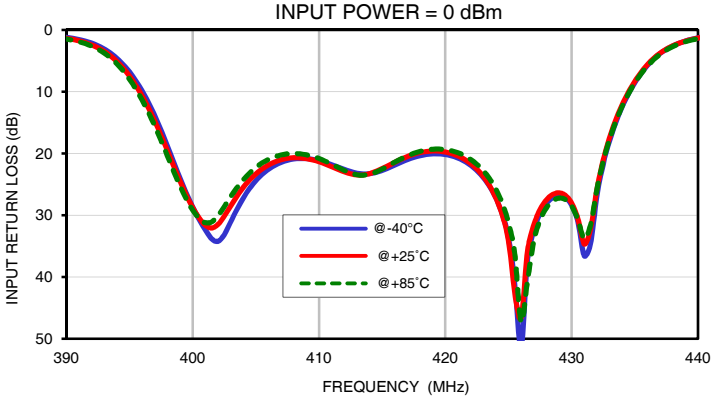
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



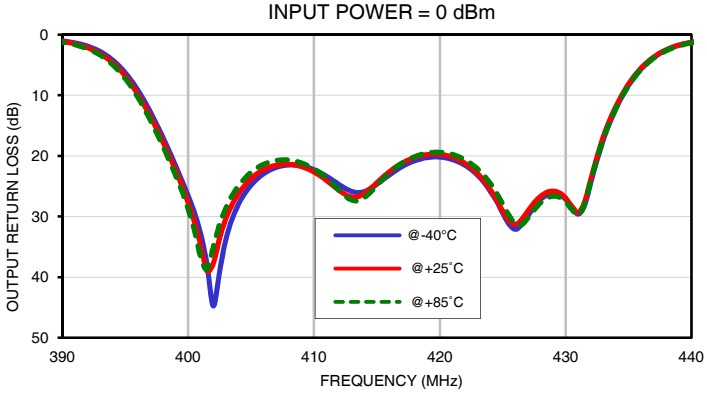
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



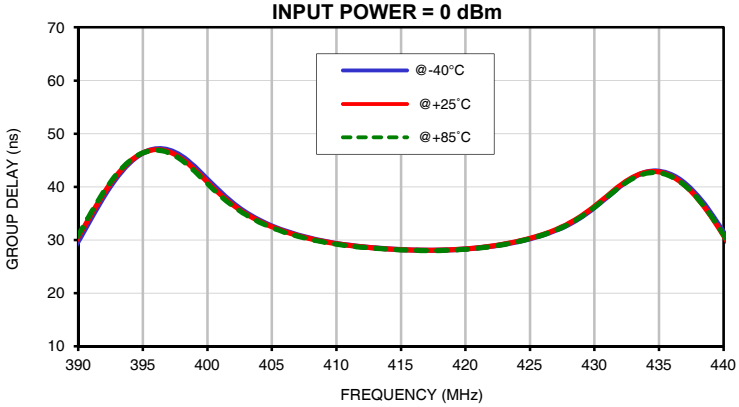
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



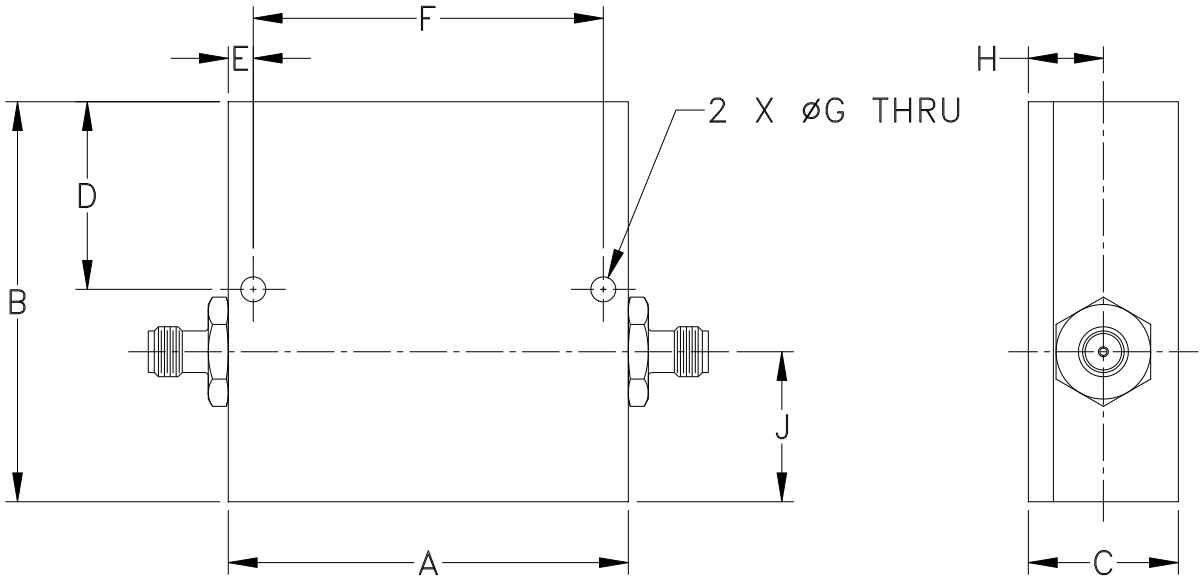
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



Case Style CC

Outline Dimensions

CC1764



CASE#	A	B	C	D	E	F	G	H	J	WT. GRAMS
CC1764	2.000 (50.80)	2.000 (50.80)	0.750 (19.05)	0.938 (23.83)	0.125 (3.18)	1.750 (44.45)	0.125 (3.18)	0.375 (9.53)	0.750 (19.05)	116

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3 Pl. ± .015

Notes:

1. Case material: Aluminum alloy.
2. Case finish:
   For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
3. Refer to the individual model data sheet for the type of connectors available.

Mini-Circuits

Environmental Specifications ENV125

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet