

HC05 Series

Fixed Attenuators

Technical Characteristics

Electrical

Nominal Impedance	50 ohms																																											
Frequency Range	DC - 12.4 GHz [*18 GHz for S option]																																											
Attenuation Values Available	0 - 20 in 1 dB increments																																											
Attenuation Accuracy	<table border="1"> <thead> <tr> <th colspan="5">ATTENUATION ACCURACY</th> </tr> <tr> <th>dB</th> <th>DC - 4 GHz</th> <th>4 - 8 GHz</th> <th>8 - 12.4 GHz</th> <th>12.4 - 18 GHz*</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>-0,+.3</td> <td>-0,+.5</td> <td>-0,+.5</td> <td>-0,+.5</td> </tr> <tr> <td>1 - 3</td> <td>±0.3</td> <td>±0.5</td> <td>±0.5</td> <td>±0.5</td> </tr> <tr> <td>4 - 6</td> <td>±0.4</td> <td>±0.5</td> <td>±0.5</td> <td>±0.75</td> </tr> <tr> <td>7 - 10</td> <td>±0.5</td> <td>±0.5</td> <td>±0.75</td> <td>±1.0</td> </tr> <tr> <td>11 - 15</td> <td>±0.75</td> <td>+0.5,-3.0</td> <td>+0.5,-3.5</td> <td>---</td> </tr> <tr> <td>16 - 20</td> <td>±1.0</td> <td>+0.5,-4.0</td> <td>+1.0,-6.0</td> <td>---</td> </tr> </tbody> </table>				ATTENUATION ACCURACY					dB	DC - 4 GHz	4 - 8 GHz	8 - 12.4 GHz	12.4 - 18 GHz*	0	-0,+.3	-0,+.5	-0,+.5	-0,+.5	1 - 3	±0.3	±0.5	±0.5	±0.5	4 - 6	±0.4	±0.5	±0.5	±0.75	7 - 10	±0.5	±0.5	±0.75	±1.0	11 - 15	±0.75	+0.5,-3.0	+0.5,-3.5	---	16 - 20	±1.0	+0.5,-4.0	+1.0,-6.0	---
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Input Power CW	100 Milliwatts max up to 125°C																																											
Peak Power	1 watt based on 10 us pulse width @ 1% duty cycle.																																											
VSWR	DC - 4 GHz	4 - 8 GHz	8 - 18 GHz																																									
	1.25 max	1.35 max	1.50 max																																									

Environmental

Operating Temperature	-55°C to +150°C
Storage Temperature	-65°C to +150°C
Moisture Sensitivity Level	MSL 1 - unlimited

Mechanical

Substrate Material	Alumina (Al ₂ O ₃) 96%
Resistive Film	Thin film, Tantalum Nitride
Terminal Material	Thick Film, Nickel Barrier, Solder Coated (Sn60/Pb40)
Protective Coating	Polymer

Marking

Unit Marking	Marked with dB value. Legibility and permanency PER MIL-STD-130
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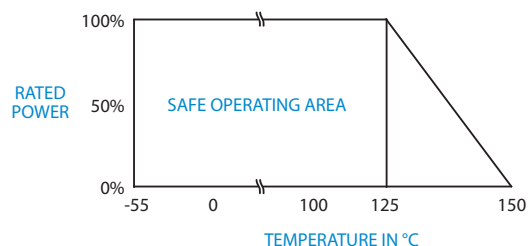
Quality Assurance

Test Plan	TP-9191
	100% Visual Pre-Cap Inspection Performed
	Group A, B and/or C testing as indicated by the part number
	Test Data Provided: 100% test data; Data retention - 24 months

Packaging

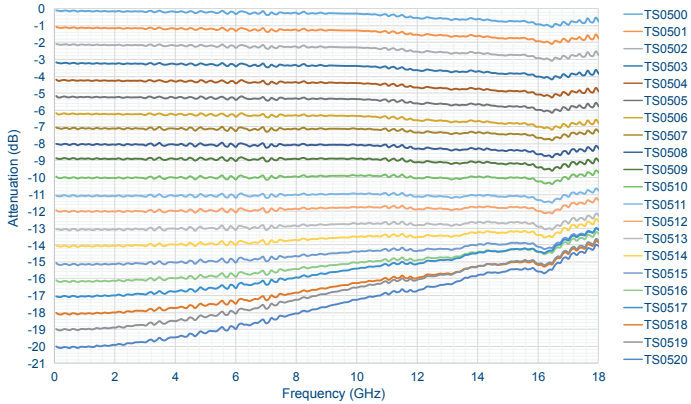
Standard Packaging	Tape and reel or serialized wafer pack
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Power Derating Curve

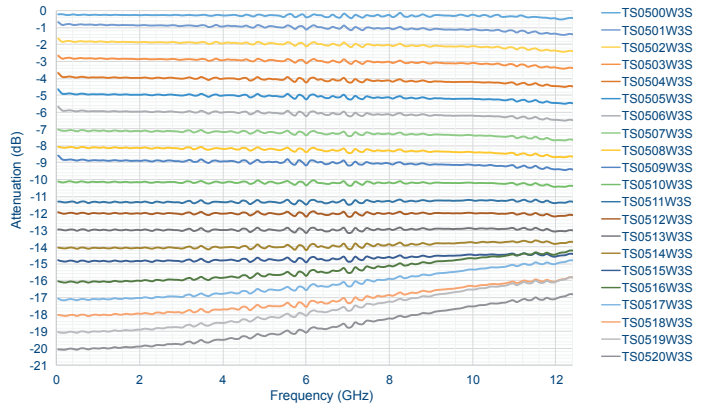


Typical Data

HC05XXS Series Attenuation

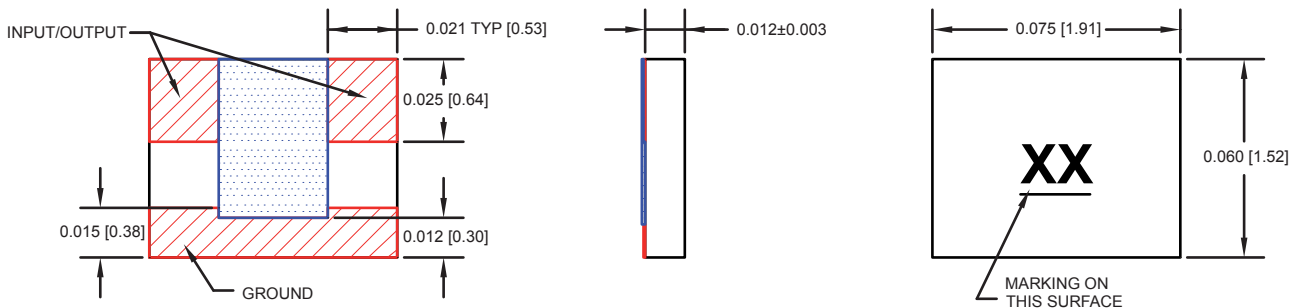


HC05XXW3S Series Attenuation

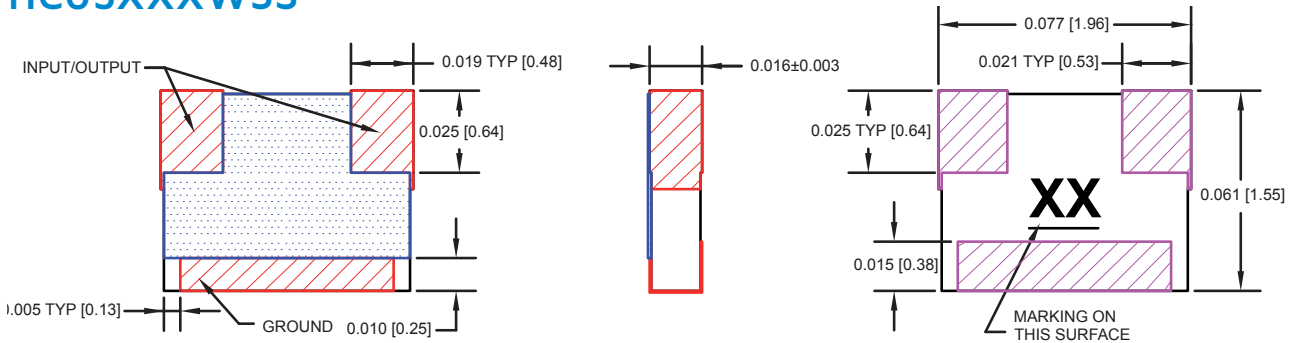


Mechanical

HC05XXXS



HC05XXXW3S



*Dimensions apply before solder. Allow 0.015 max for all pretinned surfaces.
Unless otherwise specified, tolerance: X.XXX = ±0.005

HCM Series

Thermopad® Temperature Variable Attenuators

Technical Characteristics

Electrical

	W3S option	S option
Nominal Impedance	50 ohms	
Frequency Range	DC - 12.4 GHz	-.003 dB/dB/ °C Thru -.005 dB/dB/ °C DC - 18 GHz -.006 dB/dB/ °C Thru -.009 dB/dB/ °C DC - 12.4 GHz
Attenuation Values Available	0 - 10 in 1 dB increments	
Attenuation Accuracy @25°C	±0.5 dB @ 1GHz	
VSWR	1.30:1 Max @ 1GHz	
Input Power	200 Milliwatts max up to 125°C	
Temperature Coefficient of Attenuation	-0.003, -0.004, -0.005, -0.006, -0.007, and -0.009 dB/dB/°C	
Temperature Coefficient Tolerance	±0.001 dB/dB/°C	

Environmental

Operating Temperature	-55°C to +150°C
Storage Temperature	-65°C to +150°C
Moisture Sensitivity Level	MSL 1 - unlimited

Mechanical

Substrate Material	Alumina (Al ₂ O ₃) 96%
Resistive Film	Thick film, Thermistor
Terminal Material	Thick film, Nickel Barrier, Solder Coated (Sn60/Pb40)
Protective Coating	Polymer

Marking

Unit Marking	dB value (X), Direction of Shift (N) and TCA Shift (X) Legibility and permanency per MIL-DTL-130
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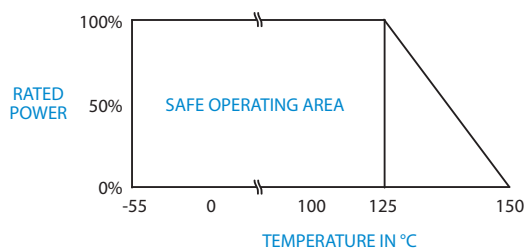
Quality Assurance

Test Plan	TP-9191
	100% Visual Pre-Cap Inspection Performed
	Perform Group A, B and/or C testing as indicated by the part number
	Test Data Provided: 100% test data; Data retention - 24 months

Packaging

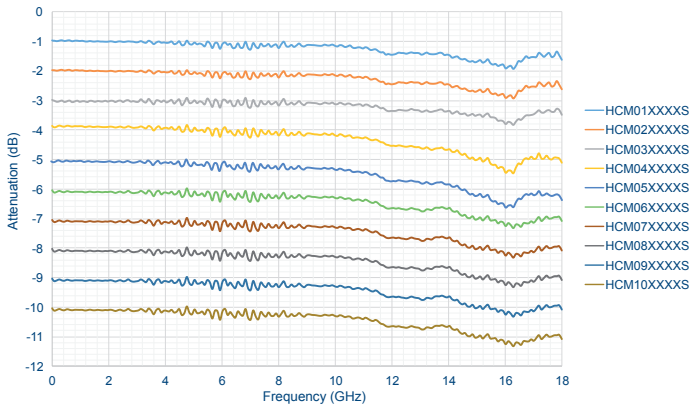
Standard Packaging	Tape and reel or serialized wafer pack
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Power Derating Curve

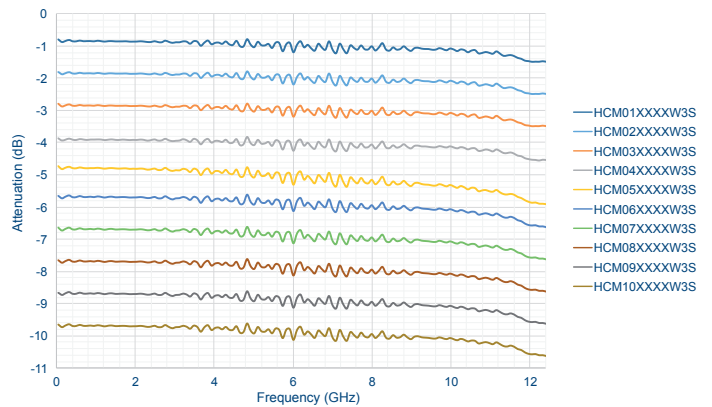


Typical Data

HCMXXXXXXS Series Attenuation

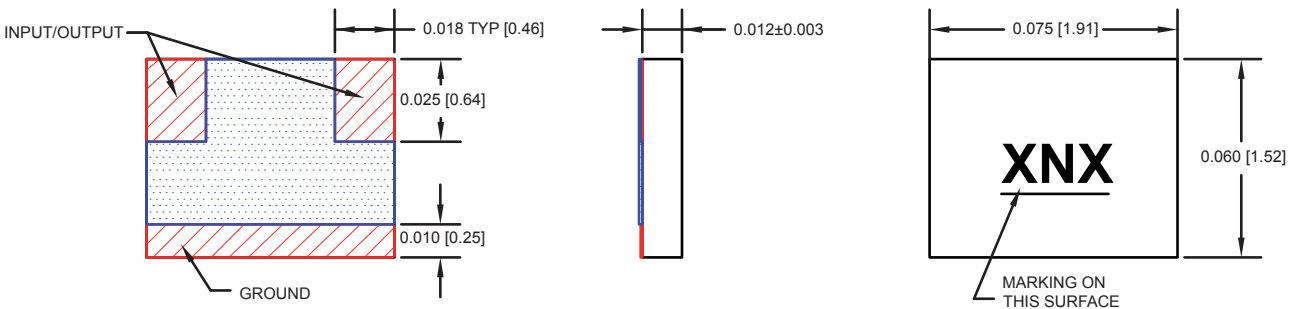


HCMXXXXXXW3S Series Attenuation

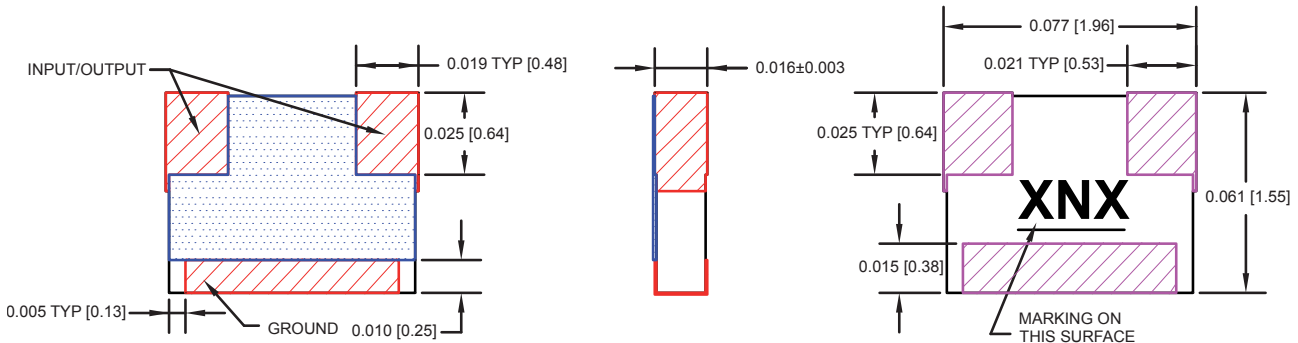


Mechanical

HCMXXXXXXS



HCMXXXXXXW3S



*Dimensions apply before solder. Allow 0.015 max for all pretinned surfaces.
Unless otherwise specified, tolerance: X.XXX = ±0.005

HC Series Attenuators and Thermopads

Test Parameters per Test Plan TP-9191

Test	Sample Qty	Test Standard and Method	Test Condition
Pre-Cap Visual and Mechanical	100%	MIL-PRF-55342	30X to 60X Magnification
Group A Inspection			
Visual / Mechanical	100%	MIL-PRF-55342	30X to 60X Magnification
Thermal Shock	100%	MIL-PRF-55342, MIL-STD-202, Method 107	10 Cycles -55 to +125°C
Bake	100%	Per Smiths Interconnect TP-9191	96 hours @ 150°C
DC Attenuation	100%	MIL-PRF-55342, MIL-STD-202, Method 303	Tolerance per dB Value @25°C
Visual and Mechanical	100%	MIL-PRF-55342	30X to 60X Magnification
Group A Lot Qualification			
Visual and Mechanical	40	MIL-PRF-55342	30X to 60X Magnification
Initial Electrical (RF) Inspection	40	MIL-PRF-55342	VSWR @1.0 GHz and Attenuation @ DC & 1.0 GHz Limits per datasheet and dB Value
Thermal Shock	40	MIL-PRF-55342, MIL-STD-202, Method 107	10 Cycles -55 to +125°C
Burn In	40	MIL-PRF-55342, MIL-STD-202, Method 108	Maximum Rated Input Power @ 125°C for *Exception 168 Hours
Final Electrical (RF) Inspection	40	MIL-PRF-55342	VSWR @1.0 GHz and Attenuation @ DC & 1.0 GHz ±0.2 dB from Initial Electrical (RF) Inspection allowable
Percent Defective Allowable (PDA)	40	Per Smiths Interconnect TP-9191	10% allowable
Subgroup 1	3		
Temperature Coefficient of Attenuation TCA (If Temp Variable Product)	3	Per Smiths Interconnect TP-9191	-55°C to +125°C - ±0.001 dB/dB/°C allowable
Group B Inspection			
Subgroup 1	10		
Electrical (RF) Inspection	10	MIL-PRF-55342	VSWR @1.0 GHz and Attenuation @ DC & 1.0 GHz Limits per datasheet and dB Value
Low Temperature Operation	10	MIL-PRF-55342	Maximum Rated Input Power @ -55°C *Exception -55°C
Electrical (RF) Inspection	10	MIL-PRF-55342	VSWR @1.0 GHz and Attenuation @ DC & 1.0 GHz Limits per datasheet and dB Value
High Temperature Exposure	10	MIL-PRF-55342	100 hours @ *Exception 125°C
Electrical (RF) Inspection	10	MIL-PRF-55342	VSWR @1.0 GHz and Attenuation @ DC & 1.0 GHz Limits per datasheet and dB Value
Termination Adhesion	10	MIL-PRF-55342, MIL-STD-202, Method 211	Test Condition A - Pull Test - *Exception 15 Grams
Termination Solderability (Resistance to Soldering Heat)	10	MIL-PRF-55342, MIL-STD-202, Method 210	Test Condition B - Solder Dip - Sn/Pb 22-°C for 5 seconds
Subgroup 2	10		
Initial Electrical (RF) Inspection	40	MIL-PRF-55342	VSWR @1.0 GHz and Attenuation @ DC & 1.0 GHz Limits per datasheet and dB Value
Life Test	10	MIL-PRF-55342, MIL-STD-202, Method 108	Test Condition D - Maximum Rated Input Power @ 70°C for 1000 Hours, Electrical measurements made @ 250, 500, 1000 hours
Final Electrical (RF) Inspection	40	MIL-PRF-55342	VSWR @1.0 GHz and Attenuation @ DC & 1.0 GHz Limits per datasheet and dB Value
Group C Inspection			
Load Life	20	MIL-PRF-55342, MIL-STD-202, Method 108	Test Condition D - Maximum Rated Input Power @ 125°C for 1000 Hours, Electrical measurements made @ 0, 250, 500, 1000 hours
Electrical (RF) Inspection	10	MIL-PRF-55342	VSWR @1.0 GHz and Attenuation @ DC & 1.0 GHz Limits per datasheet and dB Value