

CONTINUUM

SCALABLE

TEST CABLE PLATFORM TO 40 GHZ

SCALABILITY AT THE BENCH

HIGH TENSILE STRENGTH

THERMAL STABILITY

STABILITY WITH FLEXURE

HIGH CRUSH RESISTANCE

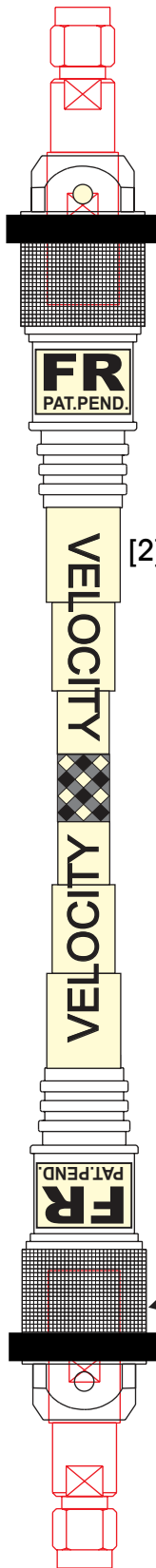
EXTENDED OPERATING LIFE

VELOCITY MICROWAVE

SUSTAINABLE SOLUTIONS

FIGURE 8 in Microwave Design FIGURE 9

CONTINUUM CABLE ASSEMBLY OPTIONS



SERIES	CONNECTOR 1	GENDER	CONNECTOR 2	GENDER	** NOMINAL LENGTH
CTM	24NMDF	29	29	M/F	28 IN. (711mm)
	29NMDF	SMA	SMA	M/F	39 IN. (991mm)
	35NMDF	35	35	M/F	48 IN. (1219mm)
	[1] 18NMDF	N	N	M/F	

NOTE: NMD FEMALE ONLY

*PEI: Polyetherimide: thermally stable plastic

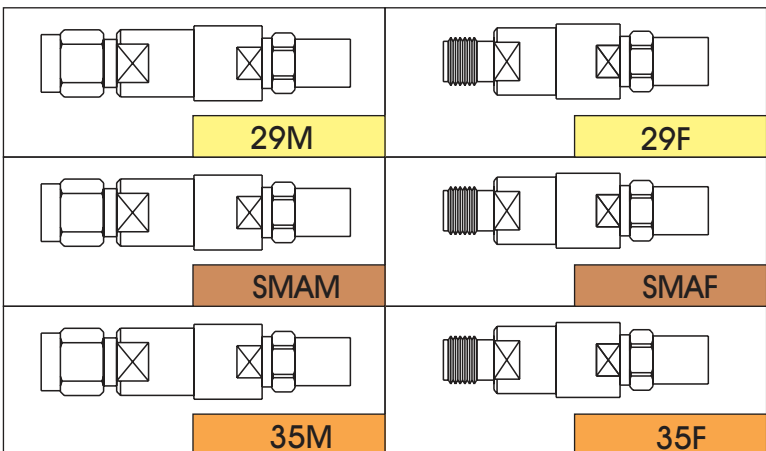
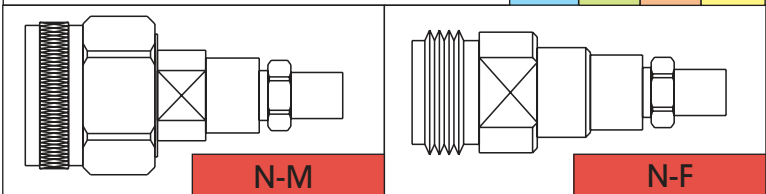
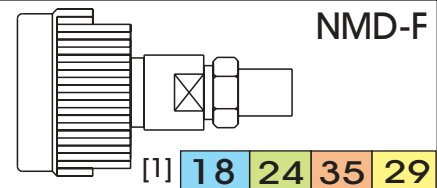
24	2.4mm subminiature	50 Ghz
29	2.92mm subminiature	40 Ghz
SMA	Subminiature with PEI* core	20 Ghz
35	3.5mm subminiature airline core	27 Ghz
N	Type N 7mm connector	18 Ghz

** LENGTH TOLERANCE: [-.25 / + Δ] WHERE Δ TYPICALLY ~ 500 MILS - 750 MILS

EXAMPLE: CTM-24NMDF-35M-28

CONTINUUM TERMINATION OPTIONS

NOTE: NMD-F WILL ONLY MATE TO ANALYZER PORTS OF MALE GENDER. THEY WILL NOT MATE WITH STANDARD MALE CONNECTORS



NOTES

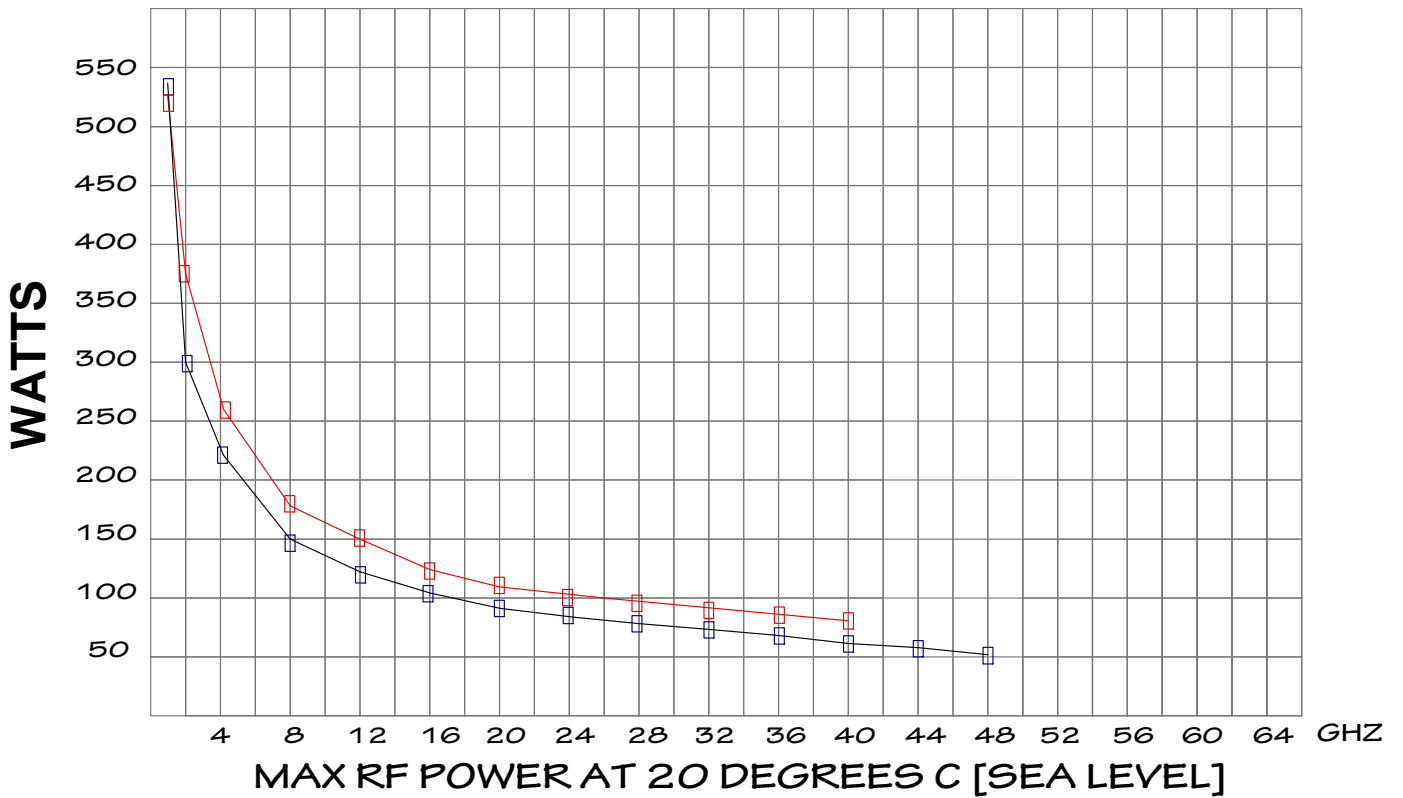
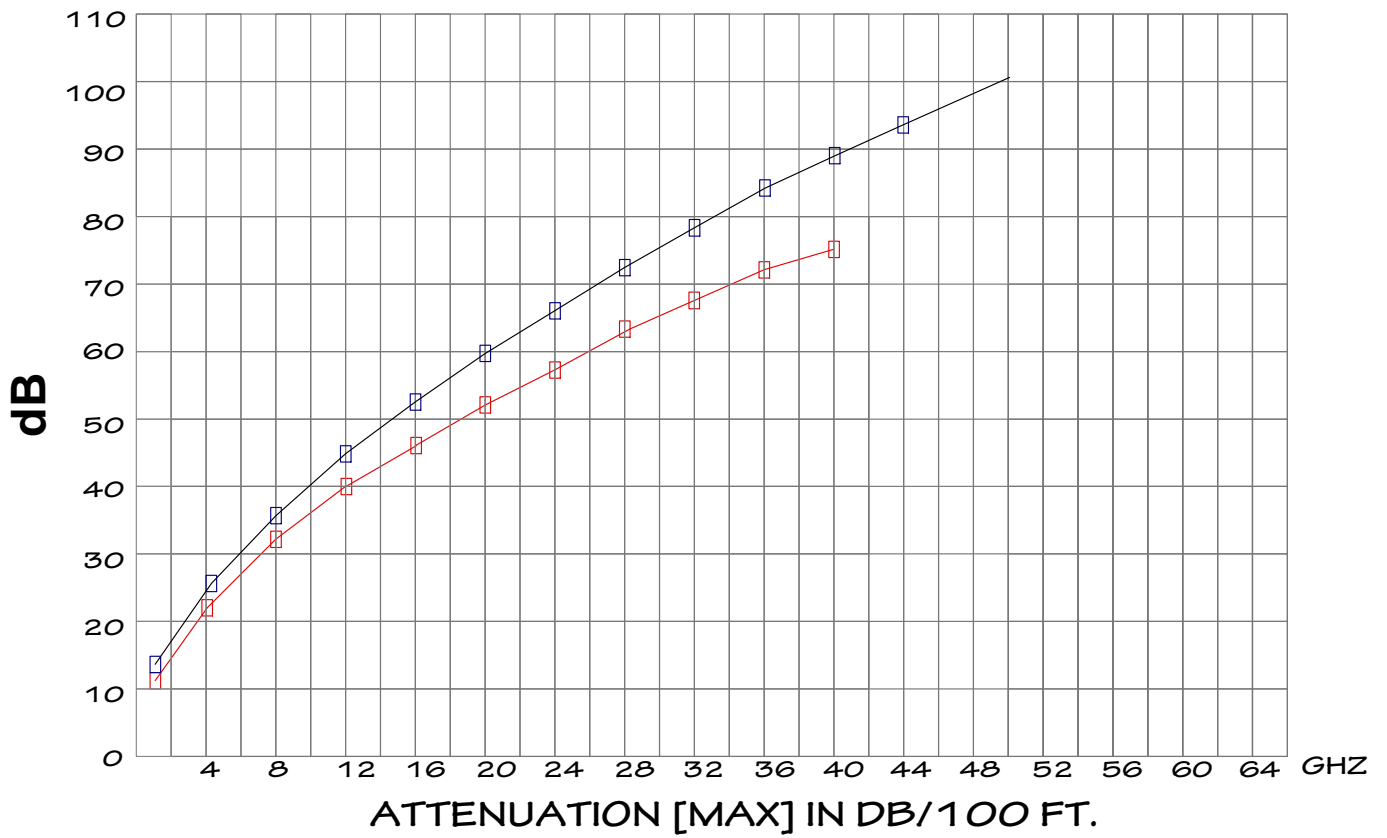
[i] Assembly shall be serialized at one end or centrally; connectors shall be gaged and capped prior to delivery; calibration including S parameters with data, plus phase and amplitude stability data, shall be reported on printed media or requested on disk. Cable shall be housed in a PPP-C-795D CLASS 2 enclosure.

[ii] Continuum is a scalable platform wherein the ruggedized transmission line acts as a host for replaceable connectors.

[iii] Continuum series cables use a proprietary torquing and fastening means to facilitate connector removal and replacement in the field among any of the available terminating options listed here. The torquing means is bored, and dimensions are machined - to create conditions that hold conductors and socket pins harmless if proper technique is employed. Within the family of VM assemblies the Continuum has been designed as both a field *replaceable* as well as a *scalable* solution for those wanting flexibility at the test bench with regard to connector options relative to test requirements. A tool kit is available for field connector replacement. [iv] A typical deployment might use a 2.9mm NMDF for VNA port extension, and the DUT side might use 3.5mm male or female. After a period of time, the user may have different test needs and may swap the DUT side connector for another species, say Type N or 2.92mm. Alternatively, the Continuum series may be viewed as a repairable field solution where scalability is not a desired objective. [v] **Connector replacement is rated at 500 mating cycles, minimum, with proper care and replacement technique per VM written and visual guidance.**

[1] 1.85mm NMDF AVAILABLE 3Q2017

[2] O-RING, JACKET, LABEL ART & BOOT COLORS ARE NOT SPECIFIED AND MAY VARY ACROSS LOTS.



SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

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CONTINUUM

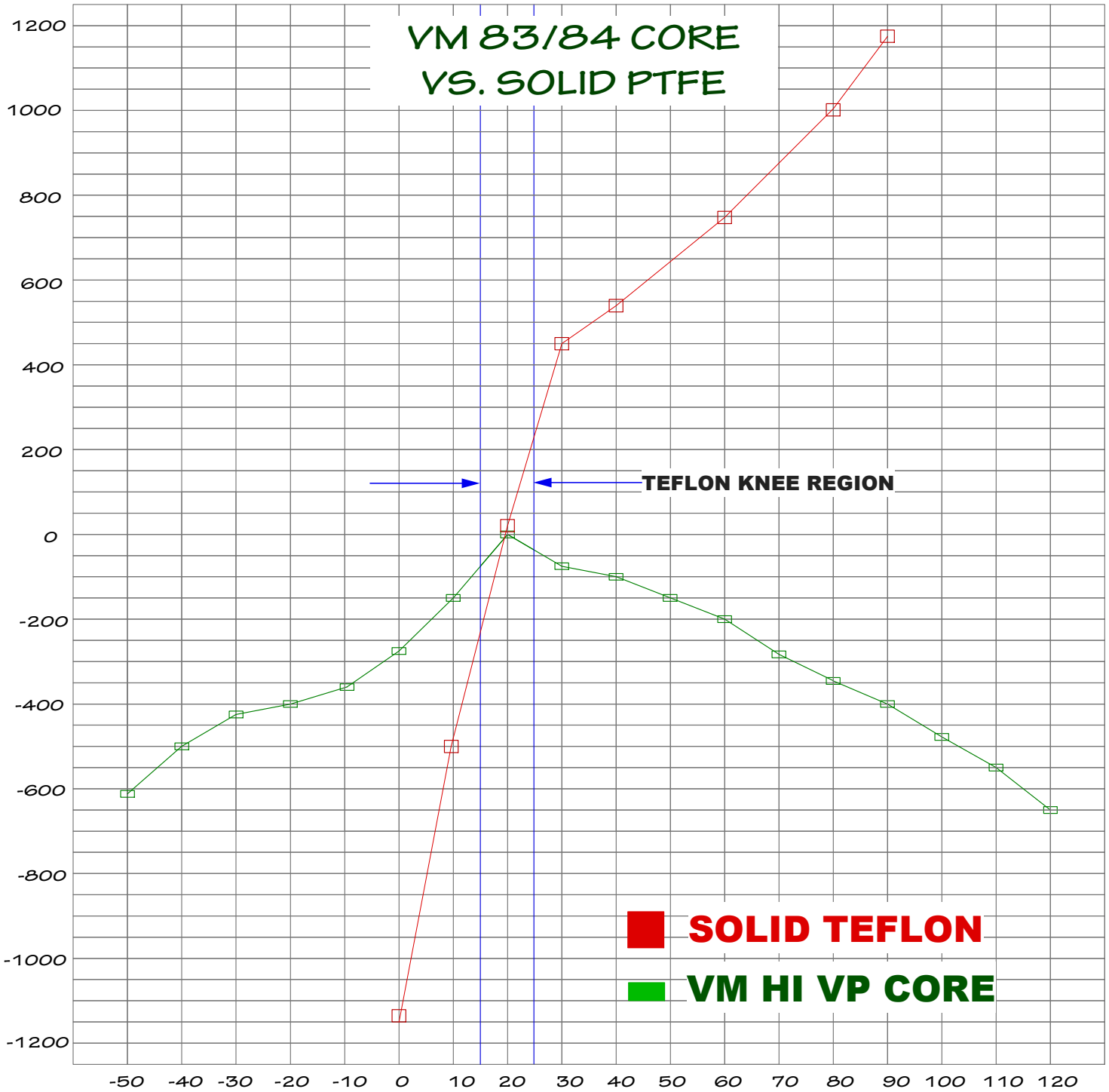
PRECISION SCALABLE CABLE ASSEMBLY
OPERATING TO 40 GHz

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MAXIMUM PHASE CHANGE VS TEMPERATURE

VM 83/84 CORE
VS. SOLID PTFE



$\Delta\Phi = 3.63E-05 \times L \times F \times PPM$, WHERE L [INCHES], F [GHZ], & PPM AS GIVEN PER CHART. FOR EXAMPLE, FOR L = 24 INCHES, F = 40 GHZ, PPM = 75, THEN $\Delta\Phi = 2.6$ DEGREES MAX PHASE VARIATION IN THE REGION OF THE TEFLON KNEE BETWEEN 15C AND 25C.

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SUSTAINABILITY

ALL VELOCITY MICROWAVE [VM] CABLE ASSEMBLIES, IN THE INTEREST OF SUPPORTING PRUDENT ECO MANAGEMENT AND MINIMAL WASTE FOOTPRINT, ARE BUILT TO BE SUSTAINABLE, WHERE SUSTAINABILITY IMPLIES A MODULAR BUILD THAT SUPPORTS COMPONENT **REPLACEABILITY** TO EXTEND PRODUCT LIFE. ONE SUCH FEATURE IS THE ABILITY TO REPLACE THE CONNECTORS, SOMETHING THAT CAN BE DONE BY VM, OR EVEN IN THE FIELD BY THE END USER - ON THE **CONEXUS AND LABFLEX** PLATFORMS.

THE **CONTINUUM** PLATFORM OFFERS NOT ONLY FIELD REPAIR CAPABILITY (WHICH IS VIEWED AS AN INFREQUENT REQUIREMENT) BUT ALSO CONNECTOR **SCALABILITY** ON THE CONTINUUM SERIES WHICH IS VIEWED AS A MORE FREQUENT OPTION THAT IS EXERCISED IN THE INTEREST OF FLEXIBILITY AT THE TEST BENCH. VM HAS FIELD KITS FOR THESE PLATFORMS THAT SUPPORT THE FIELD REPLACEMENT AND SCALING BETWEEN CONNECTORS. HOWEVER, WE ONLY RECOMMEND FIELD REPLACEMENT IF CERTAIN CONDITIONS ARE IN PLACE, AS DEFINED BELOW:

[A] GAGING RESOURCES [LABFLEX(LF), CONEXUS(GP)]: THE FIELD TECHNICIAN SHALL BE ABLE TO ACCURATELY GAUGE CONNECTORS TO DETERMINE - WITH UNCERTAINTIES - THE RECESSION CHARACTERISTICS OF THE CONNECTOR THAT IS IDENTIFIED AS A CANDIDATE FOR REPLACEMENT. CONNECTOR HEALTH DEPENDS TO A LARGE EXTENT ON RECESSION CHARACTERISTICS, AND IN MALE/FEMALE ENGAGEMENT THE FEMALE IS OFTEN THE SACRIFICIAL COMPONENT WHEN RECESSION COMPLIANCE IS VIOLATED.

[B] CALIBRATION RESOURCES [LABFLEX(LF), CONEXUS(GP)]: THE FIELD TECHNICIAN - IN THE EVENT OF AN ELECTRICAL FAULT - SHALL BE ABLE TO ACCURATELY DETERMINE LINE CONDITIONS AND REPLACEMENT NEEDS BASED ON DIRECT MEASUREMENT OF THE RF PATH IN THE TIME DOMAIN. TO THIS END, THE FIELD TECHNICIAN SHALL HAVE ACCESS TO CALIBRATED NETWORK ANALYZER OF SUFFICIENT BANDWIDTH AND BE ABLE TO PERFORM THE FOLLOWING: **[i] A 12 TERM CALIBRATION OR EQUIVALENT;** **[ii] ASSURANCE TESTING** - TO DETERMINE THE VALIDITY OF THE CALIBRATION USING EITHER A DIRECT MEASUREMENT OF RESIDUALS (DIRECTIVITY AND PORT MATCH) IN THE FREQUENCY DOMAIN - OR USING A GATED RETURN LOSS AFTER THE APPROPRIATE ISOLATION OF THE RESIDUAL IN TIME - FOLLOWED BY BEST PRACTICE [AS OUTLINED FOR EXAMPLE IN EURAMET *cg-12. Version 2.0 (03/2011)*, GUIDELINES ON THE EVALUATION OF VECTOR NETWORK ANALYZERS (VNA)]; **[iii] VERIFICATION TESTING** - (ALTERNATIVELY) TO DETERMINE THE VALIDITY OF THE CALIBRATION USING ARTIFACTS THAT ARE AVAILABLE IN COMMON VERIFICATION KITS, OR USING ARTIFACTS MADE AVAILABLE BY NIST.

[C] BEST PRACTICE [LABFLEX(LF), CONEXUS(GP)]: THERE IS A TECHNIQUE FOR CHANGING CONNECTORS IN THE FIELD ON THE LF AND GP PLATFORMS AND GUIDANCE IS PROVIDED BOTH IN VISUAL AND PRINTED FORM. THERE IS ALSO A FIELD KIT DESIGNED FOR THIS PURPOSE. IT, OR ITS EQUIVALENT, MUST BE USED FOR CONSISTENT FIELD RESULTS. CERTAIN TORQUE REQUIREMENTS FOR CONNECTOR ENGAGEMENT AND SCREW TIGHTENING MUST BE OBSERVED, ALONG WITH CERTAIN TECHNIQUES FOR THE REMOVAL, ALIGNMENT AND REPLACEMENT OF CONNECTORS.

[D] BEST PRACTICE [CONTINUUM(ATM)]: THERE IS A TECHNIQUE FOR SCALING UP AND DOWN THE CONNECTOR CHAIN IN THE FIELD THAT IS NONETHELESS DIFFERENT FROM THE TECHNIQUE USED FOR LF AND GP PLATFORMS. CONTINUUM IS DESIGNED FOR MORE FREQUENT CHANGES; IT HAS A VARIETY OF FEATURES DESIGNED TO HOLD HARMLESS THE CONDUCTOR AND SOCKET DURING CONNECTOR REPLACEMENT. TO THIS END CERTAIN RESTRAINTS MUST BE OBSERVED TO ACHIEVE CONSISTENT AND SUCCESSFUL MATING. PROPER ALIGNMENT IS CRITICAL. VISUAL AND WRITTEN MATERIAL IS PROVIDED BY THE MANUFACTURER FOR GUIDANCE. IT IS EXPECTED THAT THE USER WILL DEPLOY THE VM TOOL KIT THAT IS DESIGNED FOR THE FIELD REPLACEMENT OF, AND SCALING BETWEEN, CONNECTORS. IT IS ALSO EXPECTED THAT THE CONTINUUM USER SHALL HAVE - AND IF NECESSARY MAKE AVAILABLE - ASSETS SIMILAR TO THOSE OUTLINED ABOVE IN [A] THROUGH [C].

[E] MINIMAL FIELD COMPLIANCE TESTING [LF, GP, ATM]: AN S PARAMETER SWEEP IS THE MINIMAL RECOMMENDED TEST TO ESTABLISH A HEALTH CHECK BASELINE AFTER CONNECTOR CHANGES. ALL VM CABLES UNDERGO A FULL CAL, INCLUDING PHASE AND AMPLITUDE STABILITY. CONDITIONS IN THE FIELD SHOULD APPROXIMATE THE S CHARACTERISTICS MEASURED IN THE FACTORY BEFORE SHIPMENT WITHIN ABOUT 5%. PHASE AND AMPLITUDE STABILITY ARE OFFERED FOR GUIDANCE RELATIVE TO SUITABILITY AND, PER COMMON PRACTICE, ARE UNWARRANTED CHARACTERISTICS. THEY MAY CHANGE WITH AGE.

GREEN CONNECTIVITY:

VM SPECIALIZES IN WHAT IT CALLS *GREEN CONNECTIVITY* IN THE DESIGN AND MANUFACTURE OF MICROWAVE CABLE ASSEMBLIES FOR TEST AND MEASUREMENT. TO THIS END VM CABLE ASSEMBLIES ARE MODULAR, AS MODULARITY PROVIDES AN IMPORTANT DEGREE OF FREEDOM IN BEING ABLE TO ACHIEVE COMPONENT REPLACEMENT IN THE INTEREST OF BOTH A SMALLER WASTE FOOTPRINT AND A LONGER PRODUCT LIFE. HOWEVER, WHILE VM HAS CONFIDENCE IN THE SUITABILITY OF BOTH THE ASSEMBLY AND THE FIELD KIT AS PLATFORMS SUPPORTING THE GOAL OF FIELD REPLACEMENT AND SUSTAINABILITY - VM DOES NOT WARRANT THE ACTUAL REPLACEMENT BY THE END USER IN LF AND GP PLATFORMS.

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— RoHS / REACH —
COMPLIANCE CERTIFICATION

Velocity Microwave (div. ATX Labs) RoHS Compliance Certification



Velocity Microwave [hereafter designated VM], a division of ATX Labs, certifies that all of the products manufactured under the Velocity Microwave brand are in compliance with EU Directive 2011/65EU on the use of certain substances employed in electrical, electronic and microwave equipment that have been designated as hazardous.

Restricted Substance	Maximum Threshold Limit
Cadmium and its compounds	100 ppm (0.01 weight %)
Mercury and its compounds	1000 ppm (0.1 weight %)
Hexavalent chromium and its compounds	1000 ppm (0.1 weight %)
Lead and its compounds *	1000 ppm (0.1 weight %)
Polybrominated biphenyls (PBB)	1000 ppm (0.1 weight %)
Polybrominated diphenyl ethers (PBDE)	1000 ppm (0.1 weight %)
Decabromine diphenyl ether (DECA BDE)	1000 ppm (0.1 weight %)

* Except when allowed by the Directive. For example, 3500 ppm in steel, 4000 ppm in aluminum alloys and 40000 ppm in copper alloys.

VM Partial Materials List

The products in the following classes: **Labflex** cable assemblies; **Benchflex** cable assemblies; **Conexus** cable assemblies; **Conexus HD** cable assemblies; **Continuum** cable assemblies; **Vector** cable assemblies; **Ergon** interface gages and kits, **Legacy** interface gages and kits, **Element** interface gages and kits, **Datum** interface gages and kits; **VM repair** kits; VM connectors of species **SMA, 2.92mm (K); 3.5mm; 2.4mm; 1.85mm; Type N; TNC; APC-7** – contain some or all of the following materials – as well as materials not listed though nevertheless fully compliant with **EU Directive 2011/65EU**.

Material Class	Finish, Construction or Reference Standard
Alloy Steel	Copper Clad per ASTM B-501
Soft Copper	Silver plated per ASTM B-298
Copper foil	Silver plated per ASTM-B-298

Expanded PTFE	Type F6 per MIL-C-17 or ASTM D-14577		
FEP	Per ASTM D-2116, FQQ flammability test UL94		
(BLANK)			
Stainless Steel	Class AISI-303 UNS20200 SAE30303 – Per:		
	per AMS 5664U Type 1	ASTM A582 12	ASTM A262 10 Practice A/E
	AASTM E112 96	Federal Spec QQ-S-764B	DFARS 232.225.7009 10-4-11
	ASTM A484 13	DIN 50049/en10204 Type 3.1	ASTM 484 13
	Passivation per ASTM A967, AMS 2700, QQ-P-35		
PEI (Polyetherimide)	Resin certified to ASTM D 5205 PEI 0113		
Solder	SnAgCu: ~ 2.5% Silver, 0.9% copper, (100-2.5-0.9)% Tin balance; Typ.		
Aluminum	6061T6, anodized TYPES II & III per		
Polyolefin	Thin wall Heat shrinkable polyolefin MIL-DTL-23053/5 Class 1 & 3 UL224 corrosion and fire rated		
	Thick wall Heat shrinkable polyolefin MIL-DTL-23053/5 Class 1 & 3 UL224 corrosion and fire rated; encapsulating modified polyamide adhesive		
	Ultra thin wall Heat shrinkable polyolefin MIL-DTL-23053/5 Class 1 & 3 UL224 corrosion and fire rated		
Foam	Closed cell polyethylene, 2.3 lb – 4 lb. ASTM D 3575-93		
	Convuluted static dissipative <10e11 ohms polyurethane pink foam laminated to top and fitted in bottom; California 117 - Note: All Testing Done By ASTM D 3574Standard Rev. 1, 12-3-02		
Jacketing	Polyethylene terephthalate FMVSS302, UL94 flame resistance, ASTM G21 Fungus resistance		
Rubber	Oil resistant Buna N O-ring SAE J200 Durometer A70		
	High temperature Silicone SAE J200 Durometer A70		
	Steam Resistant EPDM SAE J200 Durometer A70		
Packaging	ESD shielding with lid closed; “Faraday Cage” effect restricting electrostatic charges to exterior; tested per FED-STD-101, Method 3005 for reducible sulfur		
Vinyl	Connector caps durometer of 75A, maximum temperature of 180° F. - assorted colors.		
	Vinyl substrate 30 mil (.08mm) magnetic mats and signage		
Pigments	Inkjet applied Orcal eco-solvent based inks UV protected		
Adhesives	Polyacrylate, Acrylate polymers permanent, transparent		
(BLANK)			

Velocity Microwave
(div. ATX Labs)
REACH Compliance Certification



Velocity Microwave is deeply committed to the European Union Regulation governing the Registration, Evaluation and Authorization of Chemical (**REACH EC Regulation Number 1907 / 2006**).

[I] Velocity Microwave further represents that it monitors both its internal manufacturing process, as well as that of components in its supply chain, to be free of any substance on the Candidate List of Substances of Very High Concern for Authorization (SVHC) – published in accordance with **Article 59(10) of the REACH Regulation** – and deemed authentic in only the following locus:

<https://echa.europa.eu/candidate-list-table>

[II] Velocity Microwave still further represents that no substances on the REACH SVHC Candidate list, per the above, shall be found in a concentration greater than 0.1% - by weight – in any of the products below in the list designated as **2016 PMVM**, manufactured by Velocity Microwave, or transferred through Velocity Microwave as a pass through agent by either inattention or design.

2016PMVM

Microwave Test and Measurement Cable Assemblies

Labflex microwave test cable assemblies commonly designated with the prefix LF; **Benchflex** microwave test cable assemblies commonly designated with the prefix BF; **Conexus** microwave test cable assemblies commonly designated with the prefix GP; **Conexus HD** microwave test cable assemblies commonly designated with the prefix GP and the subsequent designator HD; **Continuum** microwave test cable assemblies commonly designated with the prefix CN; **Vector** microwave test cable assemblies commonly designated with the prefix TPX; **Custom** Assemblies developed to meet specific customer requirement; **VM repair kits** deployed as field repair aids for the above microwave test cables.

Microwave Gaging Apparatus

Ergon microwave connector interface gages and kits containing ancillary components, **Legacy** microwave connector interface gages and kits containing ancillary components, **Datum** microwave connector interface gages and kits containing ancillary components; **Element** microwave connector interface gages and kits containing ancillary components; **Ancillary data port** connectors and devices for Datum Gage.

Microwave Connectors ~Subminiature and Larger Families

SMA microwave connector of the subminiature class; **2.92mm (K)** microwave connector of the subminiature class; **3.5mm** microwave connector of the subminiature class; **2.4mm** microwave connector of the subminiature class; **1.85mm** microwave connector of the subminiature class; **Type N** microwave connector 7mm class; **APC7** hermaphroditic microwave connector of the 7mm class; **TNC** microwave connector.

Microwave Torquing Apparatus

8 in-lb Torque wrench with 5/16 dimension designated for use with subminiature microwave connectors; **12 in-lb Torque wrench** with 19mm dimension designated for use with 7mm of the Type N class microwave connectors; **12 in-lb Torque wrench** with 20 dimension designated for use with 7mm of the Type N class microwave connectors; **12 in-lb Torque wrench** with 19mm dimension designated for use with NMD class microwave connectors; **12 in-lb Torque wrench** with 20 dimension designated for use with NMD class microwave connectors; **8 in-lb Torque wrench** with 19mm dimension designated for use with NMD class microwave connectors; **8 in-lb Torque wrench** with 20 dimension designated for use with NMD class microwave connectors; **20 in-lb Torque wrench** with 5/16 dimension designated for use with subminiature microwave connectors as a repair and installation aid.

Velocity Microwave

[Div. ATX Labs]

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