

RFコネクタ

LK Mechanical Lock H Offered as harness







製品情報をクリックすると、各製品紹介ページがご覧いただけます。

Product name		MHF [®] I LK	MHF [®] I	MHF [®] I	MHF [®] 4L LK	MHF [®] 4L	MHF [®] 4L	MHF [®] 4L	MHF [®] 4
Appearance		 LK H			 LK H				
		MHF[®] I with Mechanical lock	Best Insertion Loss	Most Cable O.D. options	MHF[®] 4L with Mechanical lock	Best Insertion Loss and VSWR	Industry Standard for M.2	Industry Standard for M.2	low profile 1.20 mm
Plug part number		Offered as harness	20767-001R	20278-112R-** 20351-112R-** (O.D.1.37mm)	Offered as harness	20632-001R-37	20565-001R-13	20572-001R-08	20611-001R
Receptacle part number		20279-001E-** (3 pads) / 20441-001E-01 (4 pads)			20449-001E-**(MHF [®] 4) / 20579-001E(MHF [®] 4L)				
Maximum height (mm)		2.9	3.0	2.5	2.0	1.7	1.4	1.2	1.2
Outside dimension of receptacle (mm)		3.0 x 3.0			2.0 x 2.0				
Applicable Coaxial Cable O.D. Size [AWG Size]	3.00 mm	-	-	-	-	-	-	-	-
	2.80 mm	-	-	-	-	-	-	-	-
	2.00 mm	-	[AWG 26]	-	-	-	-	-	-
	1.80 mm	[AWG 30]	-	[AWG 30]	-	-	-	-	-
	1.37 mm	[AWG 30]	-	[AWG 30]	[AWG 30]	[AWG 30]	-	-	-
	1.32 mm	[AWG 32]	-	[AWG 32]	-	-	-	-	-
	1.13 mm	[AWG 32]	-	[AWG 32]	-	-	[AWG 32]	-	-
	0.95 mm	-	-	-	-	-	[AWG 33]	-	-
	0.81 mm	[AWG 36]	-	[AWG 36]	-	-	-	[AWG 36]	[AWG 36]
	0.64 mm	-	-	-	-	-	-	[AWG 36]	-
0.48 mm	-	-	-	-	-	-	-	-	
Frequency		DC - 9 GHz			DC - 12 GHz (MHF [®] 4L Plug x MHF [®] 4L Rece) , DC - 9 GHz (MHF [®] 4L Plug x MHF [®] 4 Rece)				DC - 9 GHz
VSWR (L=100mm)	DC - 3 GHz	1.3 max.(PLUG) / 1.3 max.(RECE)			1.3 max.(Plug) / 1.3 max.(Rece)				
	3 GHz - 6 GHz	1.5 max.(PLUG) / 1.4 max.(RECE)			1.4 max.(Plug) / 1.4 max.(Rece)		1.45 max.(Plug) / 1.4 max.(Rece)		1.5 max. (Plug) / 1.4 max. (MHF 4 Rece)
	6 GHz - 9 GHz	1.6 max.(PLUG) O.D.1.32, 2.0 mm / 1.8 max.(RECE) 1.9 max.(PLUG) O.D.0.81, 1.13, 1.37, 1.80 mm / 1.8 max.(RECE)			1.5 max.(Plug) / 1.55 max.(MHF 4 Rece)		1.6 max.(Plug) / 1.55 max.(MHF 4 Rece) 1.5 max. (MHF 4L Rece)		2.0 max. (Plug) / 1.55 max. (MHF 4 Rece)
	9 GHz - 12 GHz	-			1.6 max.(Plug) / 1.65 max. (MHF 4L Rece)		1.9 max.(MHF 4L Plug) / 1.65 max. (MHF 4L Rece)		-
Service temp. (Celsius)		-40 degree ~ +90 degree							
Characteristic impedance		50ohm							
Rated voltage		AC60V							
Contact resistance		20m ohm max.							
Withstand voltage		AC200V/min							
Insulation resistance		500M ohm min./DC100V							

RFコネクタ

ZenShield® Full EMI Shield LK Mechanical Lock H Offered as harness

製品情報をクリックすると、各製品紹介ページがご覧いただけます。

Product name		MHF® 5L	MHF® 5L	MHF® 5	MHF® 5	MHF® 7S	MHF® -TI
Appearance		 H	 H	 H	 H	 H	 LK H
		Improved Insertion Loss and VSWR through 15GHz	Improved Insertion Loss and VSWR through 15GHz	low profile 1.00 mm	low profile 1.00 mm	Unique shielded design increases EMC performance	Robust SMT connector for automotive telematics antenna
Plug part number		20668-001R-13	20714-001R-81	20711-001R-81	20615-002R-48	20980-001R-13	20859-001R-01
Receptacle part number		20566-001E-01				20981-001E-02	20860-001E-01
Maximum height (mm)		1.3		1.0		1.4	3.65
Outside dimension of receptacle (mm)		2.0 x 2.0					9.4 x 5.18
Applicable Coaxial Cable O.D. Size [AWG Size]	3.00 mm	-	-	-	-	-	[AWG 25]
	2.80 mm	-	-	-	-	-	[AWG 26]
	2.00 mm	-	-	-	-	-	-
	1.80 mm	-	-	-	-	-	-
	1.37 mm	-	-	-	-	-	-
	1.32 mm	-	-	-	-	-	-
	1.13 mm	[AWG 32]	-	-	-	[AWG 32]	-
	0.95 mm	-	-	-	-	-	-
	0.81 mm	-	[AWG 33]	[AWG 36]	-	-	-
	0.64 mm	-	-	[AWG 36]	-	-	-
0.48 mm	-	-	-	[AWG 38]	-	-	
Frequency		DC - 15GHz		DC - 12GHz		DC - 15GHz	DC - 6GHz
VSWR (L=100mm)	DC - 3GHz	1.3 max. (Plug/Rece)				1.3 max. (Plug/Rece)	1.5 max. (Plug/Rece)
	3GHz - 6GHz	1.4 max.(Plug/Rece)		1.5 max.(Plug) / 1.4 max. (Rece)		1.35 max. (Plug/Rece)	1.5 max. (Plug/Rece)
	6GHz - 9GHz	1.5 max.(Plug/Rece)		1.6 max.(Plug) / 1.5 max. (Rece)		1.4 max. (Plug/Rece)	-
	9GHz - 12GHz	1.5 max.(Plug/Rece)		1.8 max. (Plug) O.D.0.64 mm, 1.7 max. (Plug) O.D.0.81 mm / 1.65 max. (Rece)	1.6 max. (Plug) / 1.65 max. (Rece)	1.45 max. (Plug/Rece)	-
	12GHz - 15GHz	1.6 max.(Plug) / 1.65 max.(Rece)		-		1.5 max. (Plug/Rece)	-
Service temp. (Celsius)		-40 degree ~ +90 degree					-40 degree ~ +105 degree
Characteristic impedance		50ohm					
Rated voltage		AC60V					
Contact resistance		20m ohm max.					
Withstand voltage		AC200V/min					
Insulation resistance		500M ohm min./DC100V					
Automotive Standards		-					USCAR-2 (*)



Note : (*) Rev.6 - 5.4.6 (Vibration), 5.6.1 (Thermal Shock), 5.6.2 (Temp. & Humidity Cycle), High Temp. Exposure & Life (5.6.3) evaluation passed

RFコネクタ : フットパターン







Product Name	MHF® I LK	MHF® I		MHF® 4L LK	MHF® 4L			MHF® 4	MHF® 5L	MHF® 5	MHF® 7S	MHF® -TI
Appearance												
Mating Height (Max.)	2.9 mm	3.0 mm	2.5 mm	2.0 mm	1.7 mm	1.4 mm	1.2 mm	1.2 mm	1.3 mm	1.0 mm	1.4 mm	3.65 mm
Footprint pattern (Reference)	<p>3 pads 4 pads MHF® I Rece.</p>			<p>MHF® 4/4L Rece.</p>			<p>MHF® 5/5L Rece.</p>		<p>MHF® 7S Rece.</p>		<p>MHF® -TI Rece.</p>	

RFアクセサリ：SMAアダプタ


SMA Adapters for MHF® Plugs

Type	For electrical performance check		For voltage check
Appearance (Reference)			
Durability (cycles)	3,000		10,000
MHF® I, I LK Plug	90193-001	-	90194-001
MHF® 4, 4L, 4L LK Plug	-	90449-001	90449-003-01
MHF® 5, 5L Plug	90543-0001	-	90586-0001
MHF® 7S Plug	91255-0001	-	91245-0001

SMA Adapters for MHF® Receptacles

Type	For electrical performance check	High cycle series				
		Normal	Narrow pitch		Detachable	
		Probe	Adaptor cable (Attach to probe)	Probe	Adaptor base (Attach to probe)	Probe
Appearance (Reference)						
Durability (cycles)	500	10,000	100	10,000	200,000	10,000
MHF® I Receptacle	90193-002	90539-001	90577-0100 (Cable: 100 mm) 90577-0350 (Cable: 350 mm)	90575-0001	90684-0001	90416-001
MHF® 4, 4L Receptacle	90449-002	90698-0001		90576-0001		90683-0001
MHF® 5 Receptacle	90543-0002	90793-0001		90847-0001		90690-0001
MHF® 7S Receptacle	91256-0001	-	91197-0300	91145-0001	-	-

RFアクセサリ：ハンドツール

Type	Insertion/ extraction tool	Extraction tool	Insertion tool	Insertion/ extraction tweezers	Extraction tweezers		Insertion/ extraction tweezers		Extraction tool
Appearance (Reference)									
MHF [®] I Plug	90224-001 90885-0001 (*)	90192-001	-	-	-	-	-	-	-
MHF [®] I LK Plug	-	-	-	-	91026-0001	91492-0001	-	-	-
MHF [®] 4 Plug	90435-001	-	-	90482-001	-	-	-	-	-
MHF [®] 4L Plug	90609-0001 (**) 90873-0001 (***)	-	-	90616-0008 90615-0013	-	-	-	-	-
MHF [®] 4L LK Plug	-	-	-	-	-	-	91166-0001	91493-0001	-
MHF [®] 5 Plug	90612-0001	-	90624-0001	-	-	-	-	-	-
MHF [®] 7S Plug	91186-0001	-	-	-	-	-	-	-	-
MHF [®] -TI Plug	-	-	-	-	-	-	-	-	91097-0001

Note

(*): 90885-0001 is for 20767-001R

(**): 90609-0001 is for 20572-001R-08 and 20565-001R-13

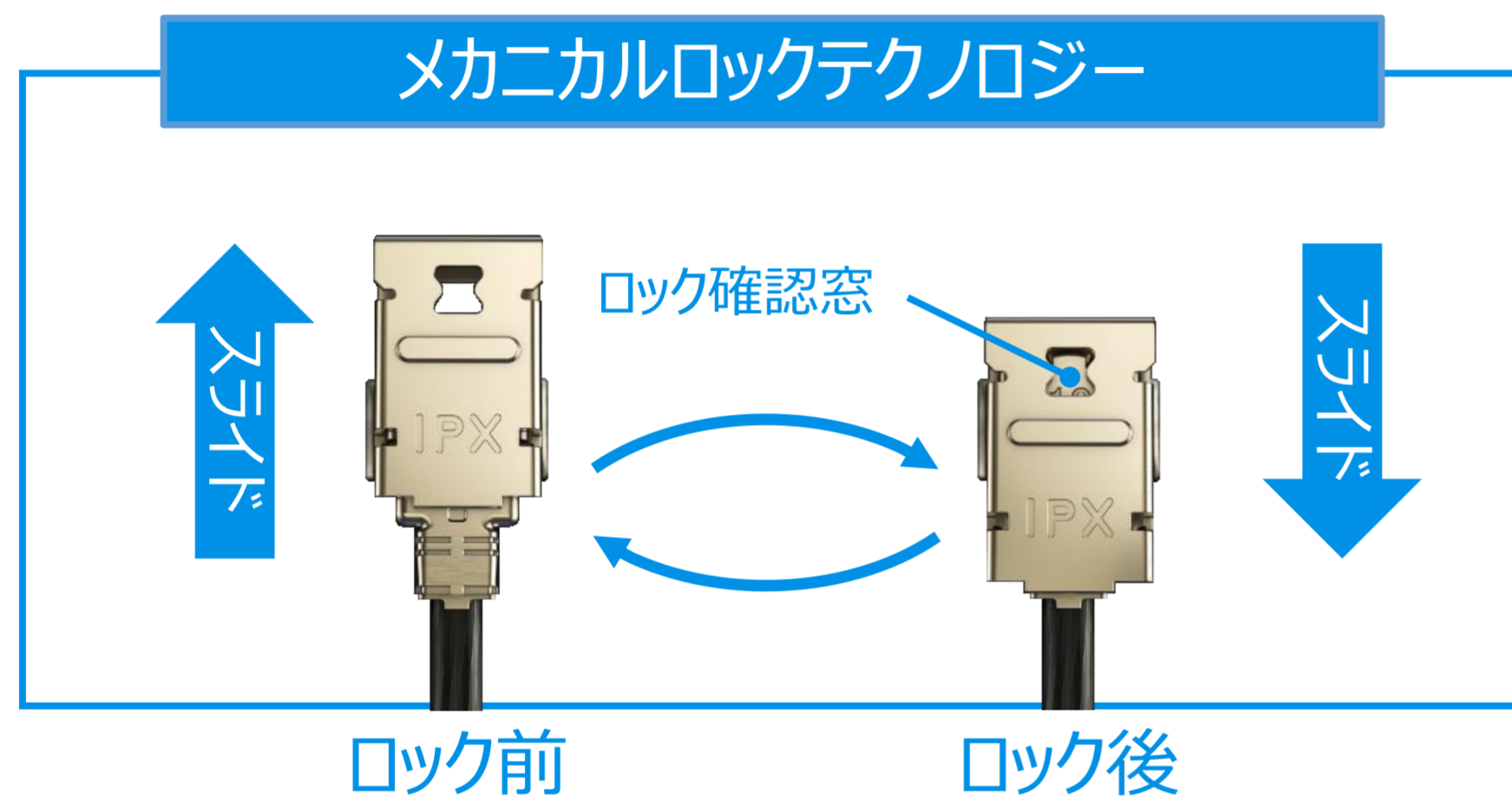
(***): 90873-0001 is for 20632-001R-37

MHF[®] Series

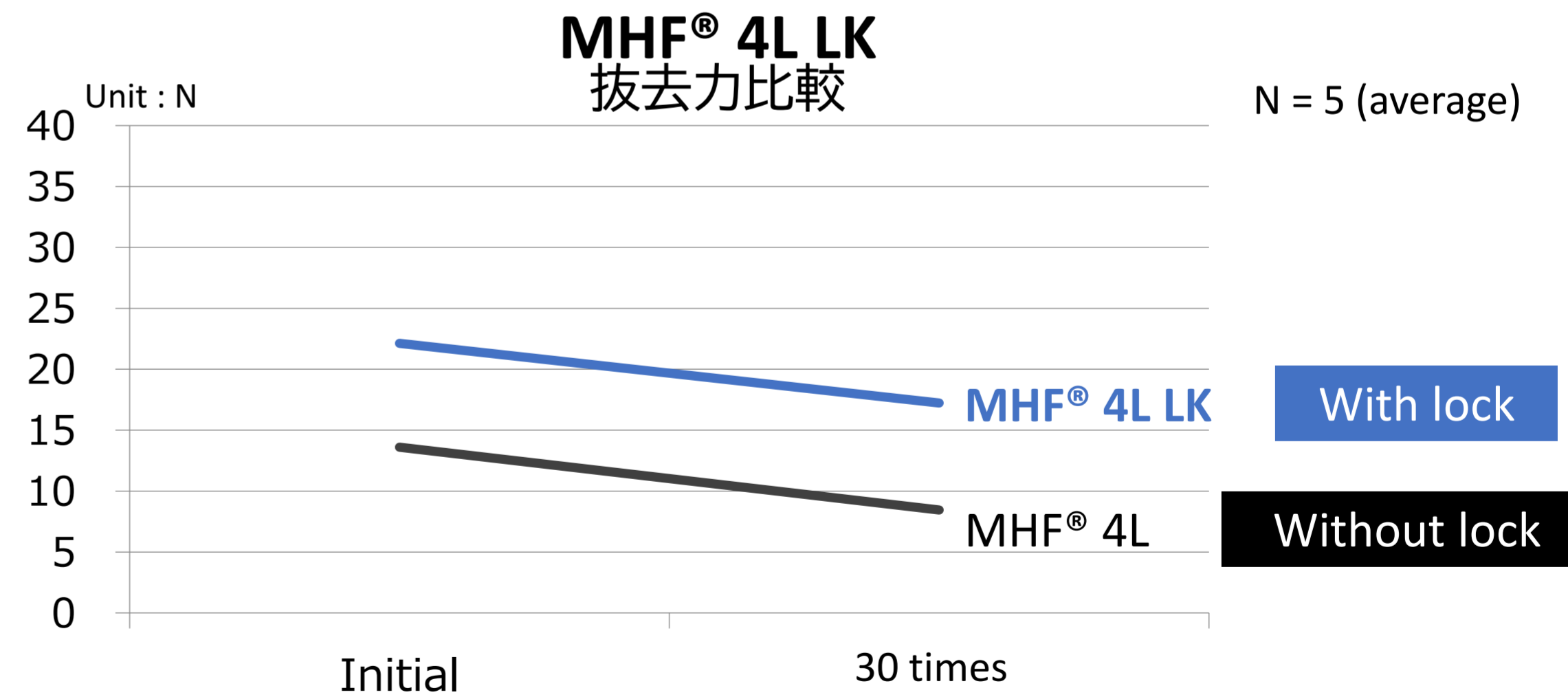
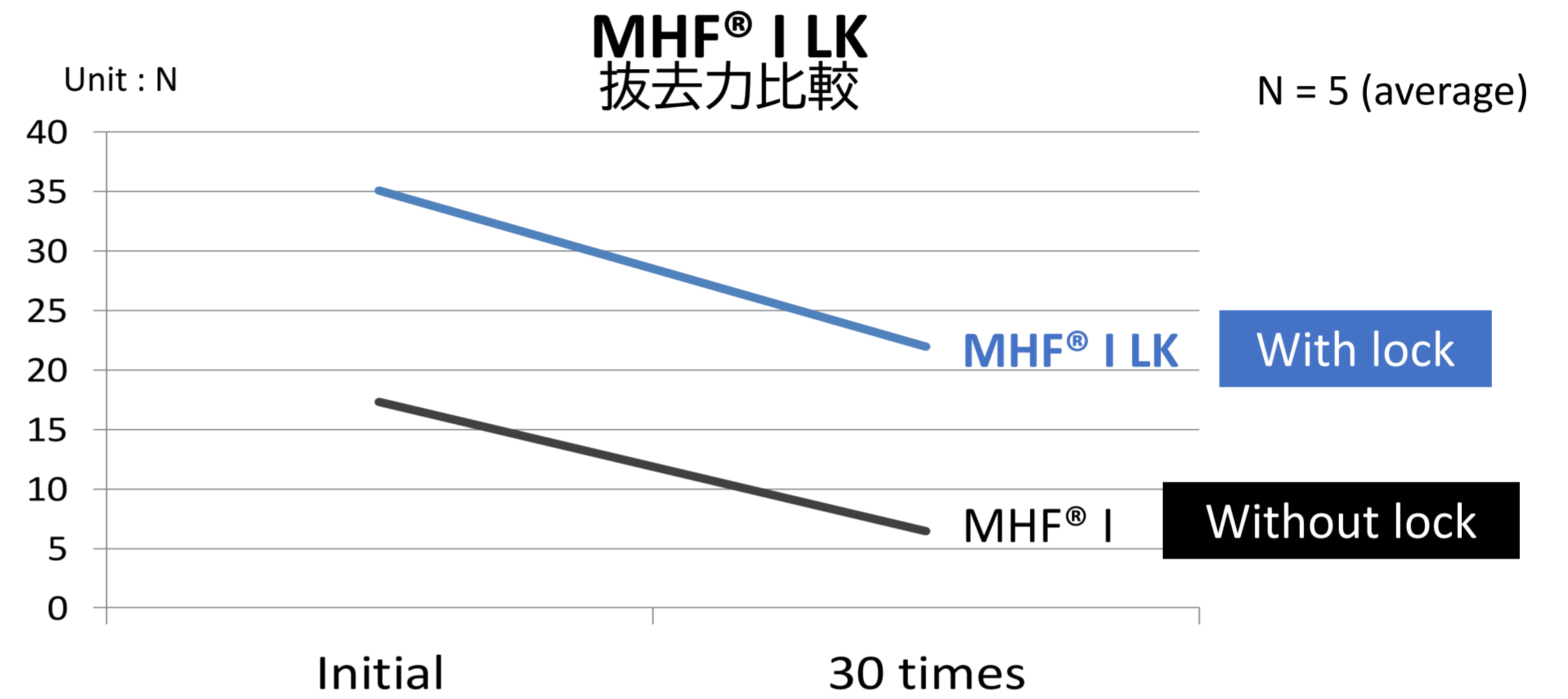
Mechanical lock

MHF[®] I LK / MHF[®] 4L LK : 継続的な衝撃及び振動対策に最適

ロック / ロック解除方法



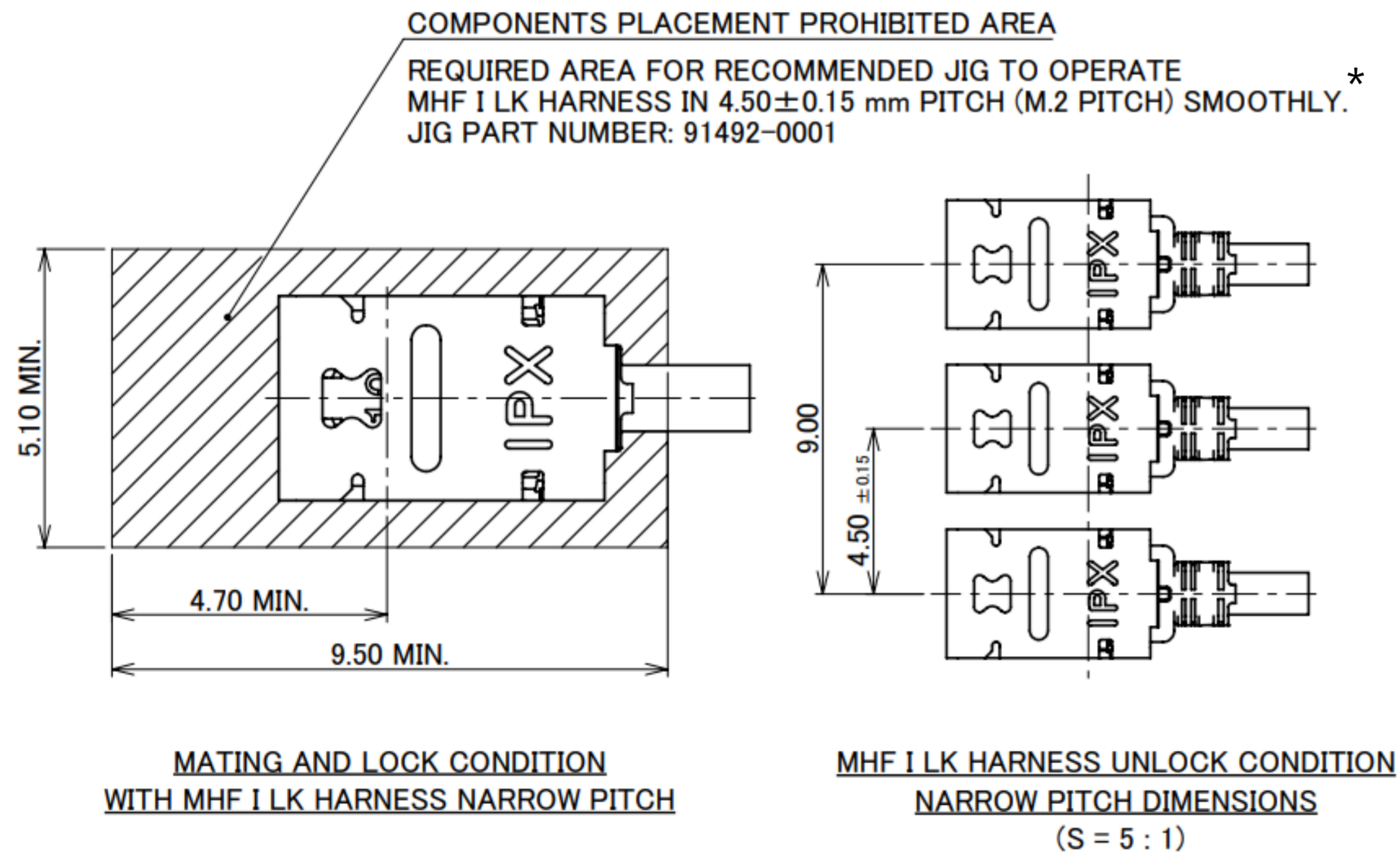
[MHF[®] I LK 動画をフル再生](#)



MHF® I LK / MHF® 4L LK : 部品配置禁止エリア

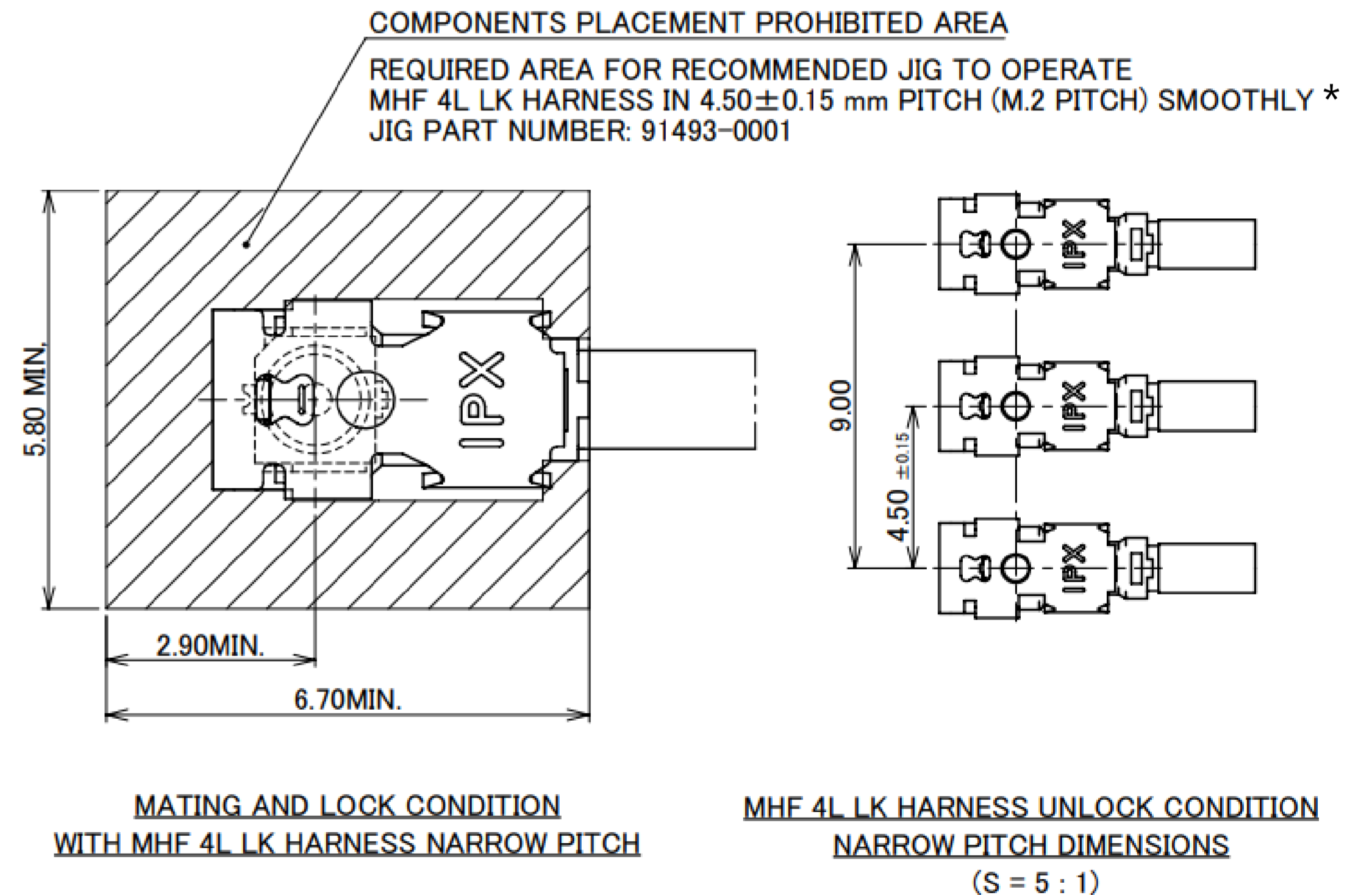
MHF I リセプタクルと適合した MHF® I LK ハーネス

MULTIPLE CONNECTORS LAYOUT



MHF 4L リセプタクルと適合した MHF® 4L LK ハーネス

MULTIPLE CONNECTORS LAYOUT




*4.5mmピッチは M.2規格に適合しています。コネクタ配置時のクリアランスはM.2規格に適合していません。

MHF[®]-TI : 車載向け小型堅牢RFコネクタ

製品情報をクリックすると、製品紹介ページがご覧いただけます。

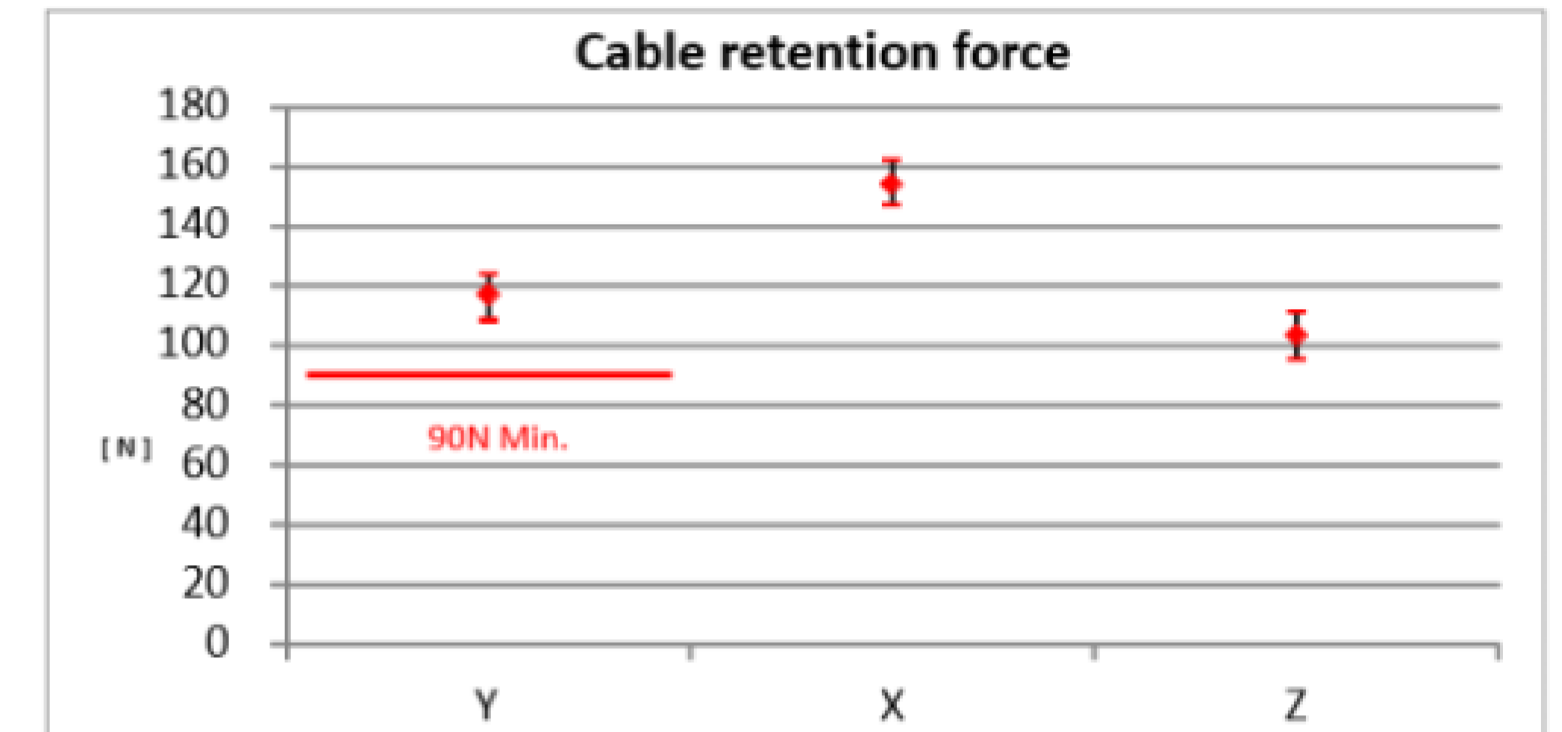
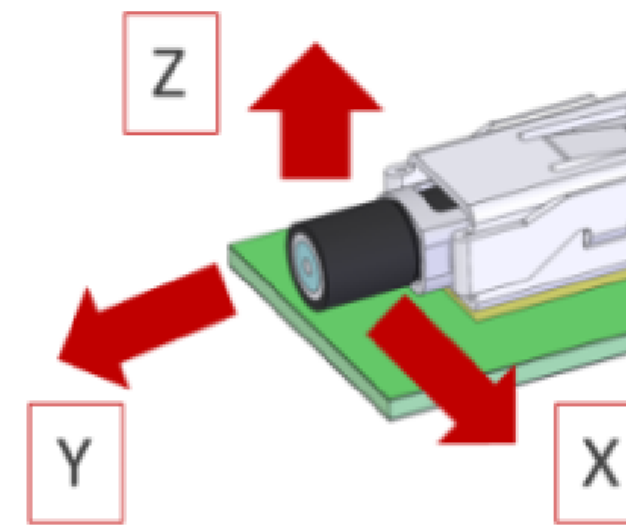


H Offered as harness

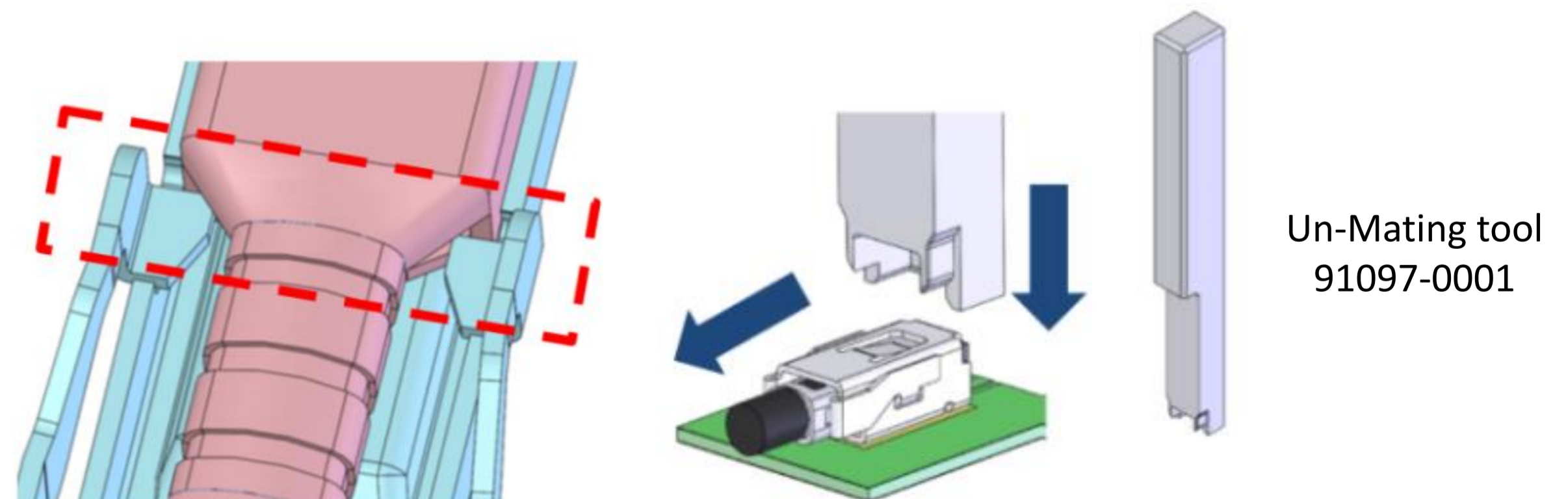
Product name		MHF [®] -TI
Appearance		 H
		車載向け小型堅牢コネクタ
Plug part number		20859-001R-01
Receptacle part number		20860-001E-01
Maximum height (mm)		3.65
Outside dimension of receptacle (mm)		9.4 x 5.18
Coax O.D. (Center Conductor AWG)		3.00 mm (25)
		2.80 mm (26)
Frequency		DC - 6GHz
VSWR (L=100mm)	DC - 6GHz	1.5 max.
Service temp. (Celsius)		-40 degree ~ +105 degree
Characteristic impedance		50ohm
Rated voltage		AC60V
Contact resistance		20 m ohm max.
Withstand voltage		AC200V/min
Insulation resistance		500M ohm min./DC100V
Automotive Standards		USCAR-2 (*)

Note : (*) Rev.6 - 5.4.6 (Vibration), 5.6.1 (Thermal Shock), 5.6.2 (Temp. & Humidity Cycle), High Temp. Exposure & Life (5.6.3) evaluation passed

■ 90N min.の高嵌合保持力



■ クリック感ある強固なポジティブロックで確実に保持




MHF[®]-SW Series




RF Switch

RFスイッチ: MHF[®]-SW23 & Accessories

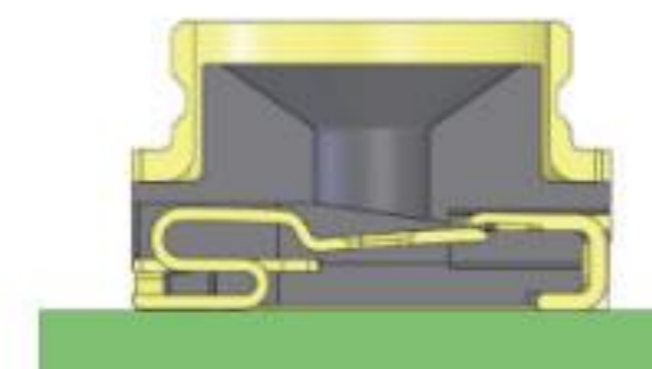
製品情報をクリックすると、製品紹介ページがご覧いただけます。 ↓

Product name		MHF [®] -SW23
Appearance		 独自のコンタミ防止構造 2.3 x 2.3 mm フットパターン
Part number		20549-001E/-01
Dimension (mm)		2.3 x 2.3 x 1.35 (H)
Rated power		2W max.
Frequency		DC - 11.0GHz
V.S.W.R.	DC - 3.0GHz	1.2 max. (DC - 2.5GHz)
	3.0GHz - 6.0GHz	1.3 max. (2.5 - 6.0GHz)
	6.0GHz - 11.0GHz	1.5 max.
Insertion loss	DC - 3.0GHz	0.15 dB max. (DC - 2.5GHz)
	3.0GHz - 6.0GHz	0.20 dB max. (2.5 - 6.0GHz)
	6.0GHz - 11.0GHz	0.40 dB max.
Isolation	DC - 3.0GHz	20 dB Max. (DC - 2.5GHz)
	3.0GHz - 6.0GHz	15 dB max.
	6.0GHz - 11.0GHz	12 dB max.
Service temp. (Celsius)		-40 degree ~ +85 degree
Characteristic impedance		50 ohm
Contact resistance	Signal contact	100m ohm
	Ground contact	100m ohm
Insulation resistance		DC100 1000M ohm min :Initial 10M ohm min :After test
Withstand voltage		AC 100V: 1min

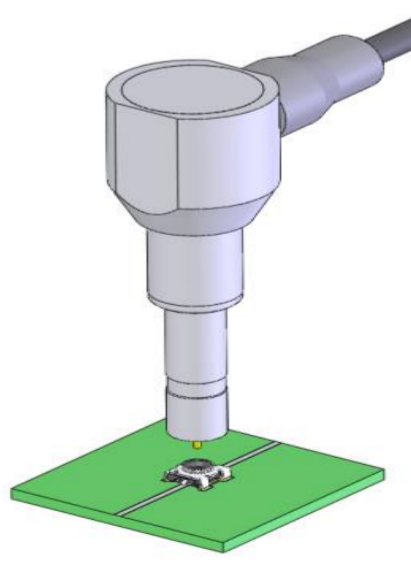
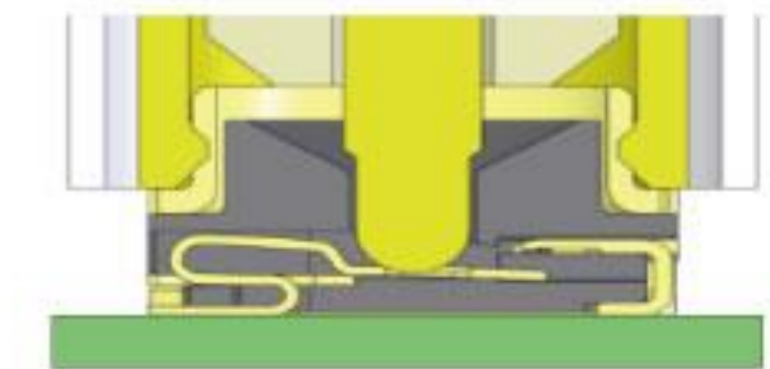
SMA Adapters for MHF[®] Switch

Type	Cable probe	High cycle series	
	Friction lock	Normal probe	Floating probe
Appearance (Reference)			
Durability (cycles)	1,000	10,000	200,000
MHF [®] -SW23	90582-0300 (Cable: 300 mm) 90582-0400 (Cable: 400 mm)	90604-0001	90605-0001

検査前



検査時



RFスイッチ用Plugハーネス: MHF[®]-SW23 plug

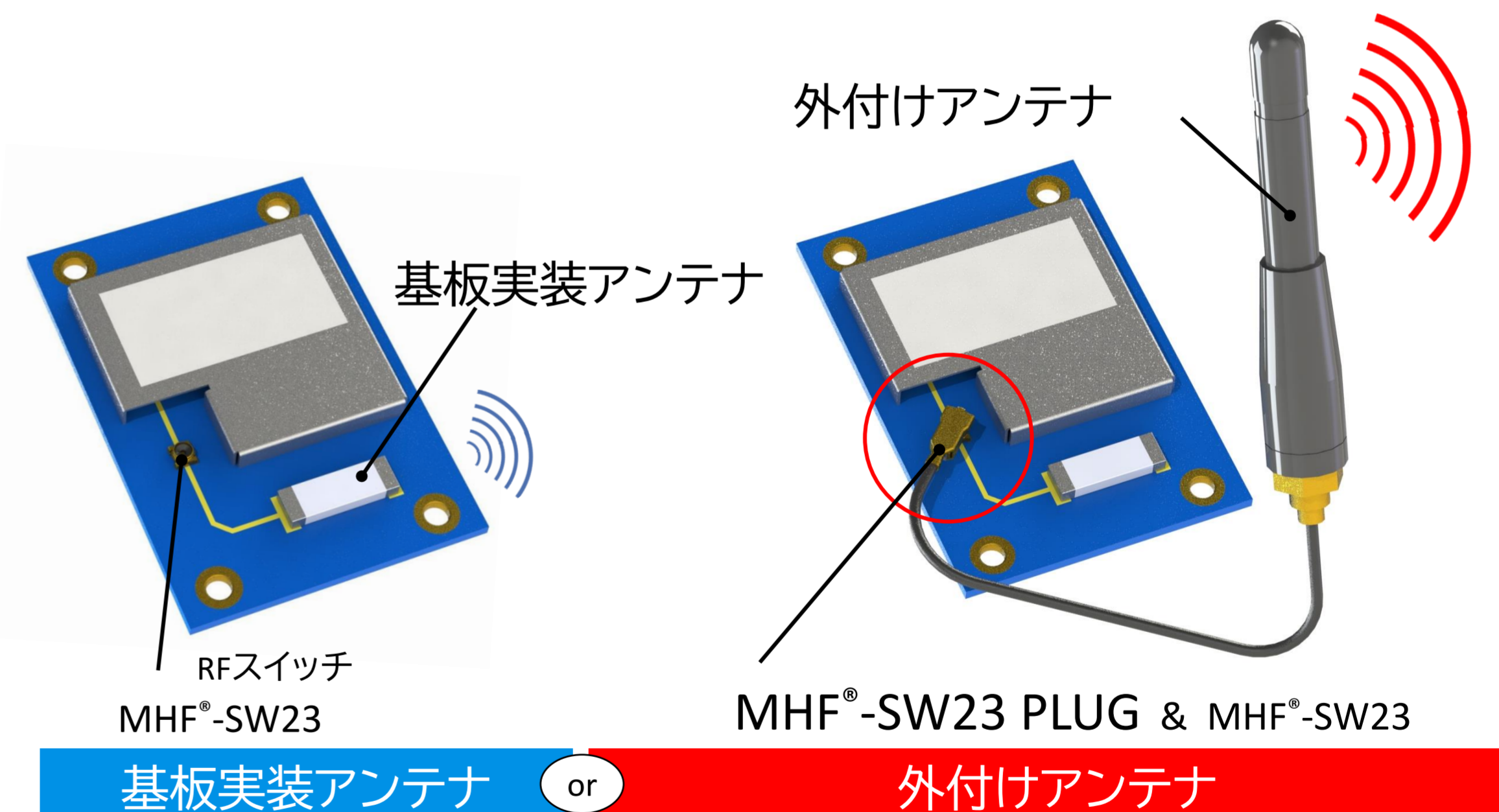
製品情報をクリックすると、製品紹介ページがご覧いただけます。



H Offered as harness

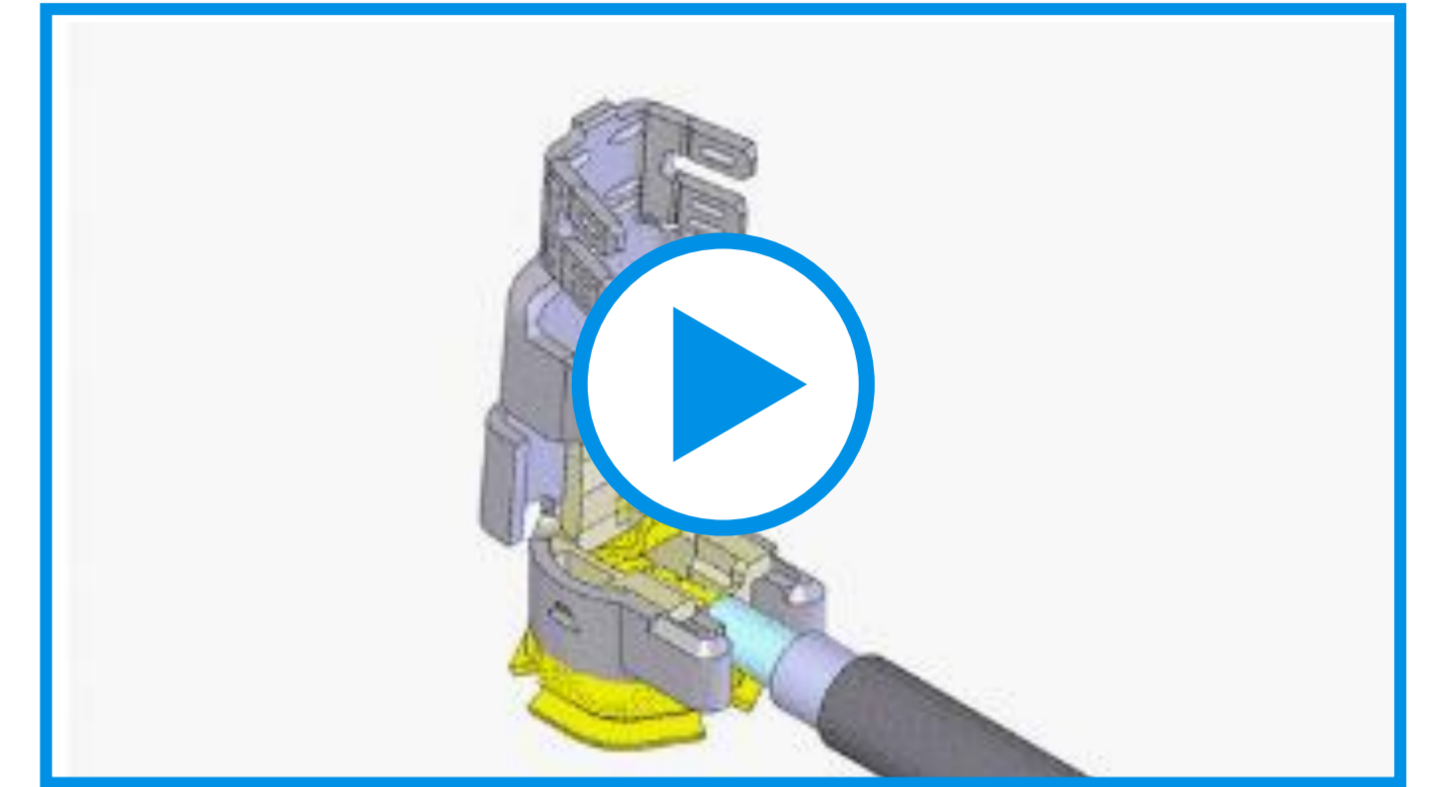
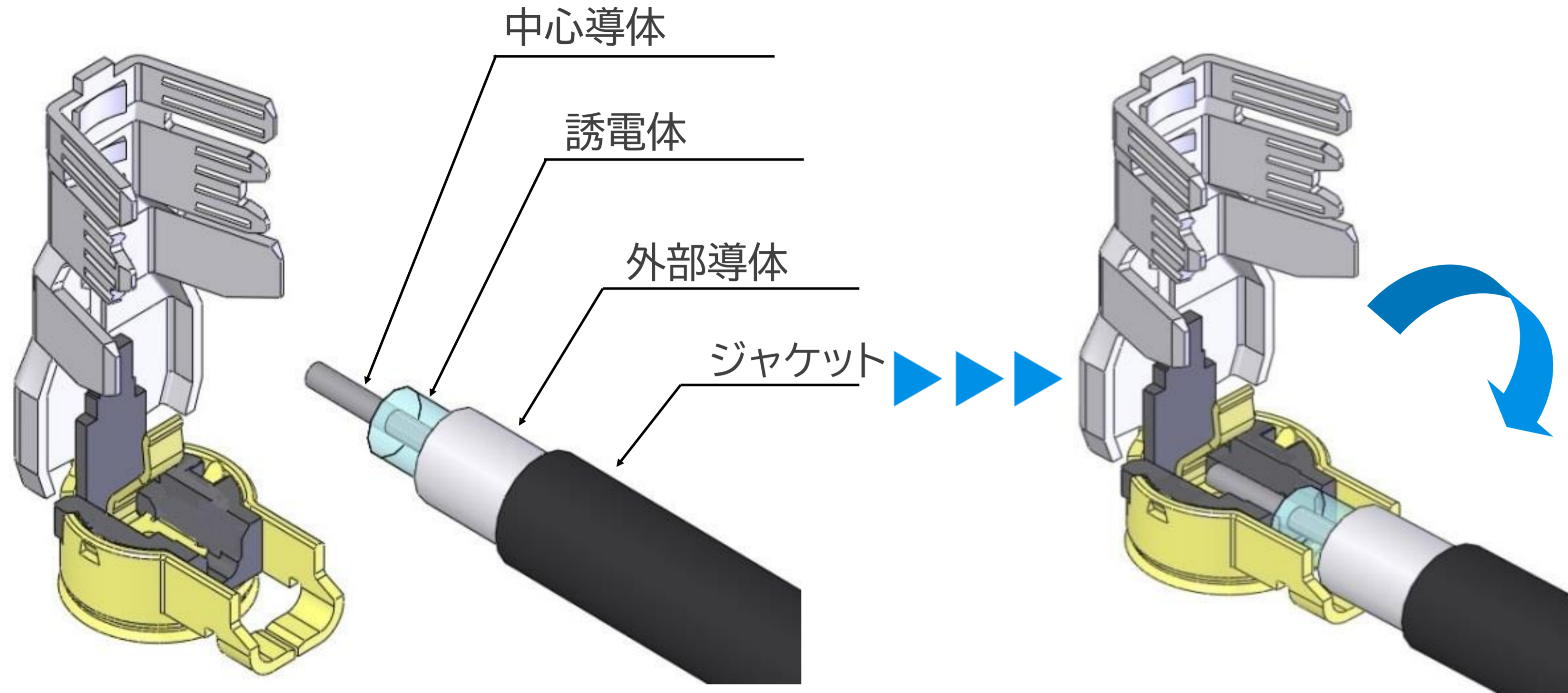
Product name		MHF [®] -SW23 Plug
Appearance		 <p>H</p> <p>RFスイッチコネクタのMHF[®]-SW23と嵌合可能</p>
Plug part number		20851-001R
Switch connector part number		20549-001E/-01 (MHF [®] -SW23)
Maximum height (mm)		3.7
Outside dimension of switch connector		2.3 x 2.3
Coax O.D. (Center Conductor AWG)		1.13 mm (32)
Frequency		DC - 9GHz
VSWR (L=100mm)	0.3 - 3GHz	1.4 max.
	3GHz - 6GHz	1.6 max.
	6GHz - 9GHz	2.0 max.
Rated power		2W max.
Service temp. (Celsius)		-40 degree ~ +85 degree
Characteristic impedance		50ohm
Contact resistance	Signal contact	100m ohm max.
	Ground contact	100m ohm max.
Insulation resistance		DC100 1000M ohm min :Initial 10M ohm min :After test
Withstand voltage		AC200V/min

基板実装アンテナ/外付けアンテナの柔軟な選択が可能



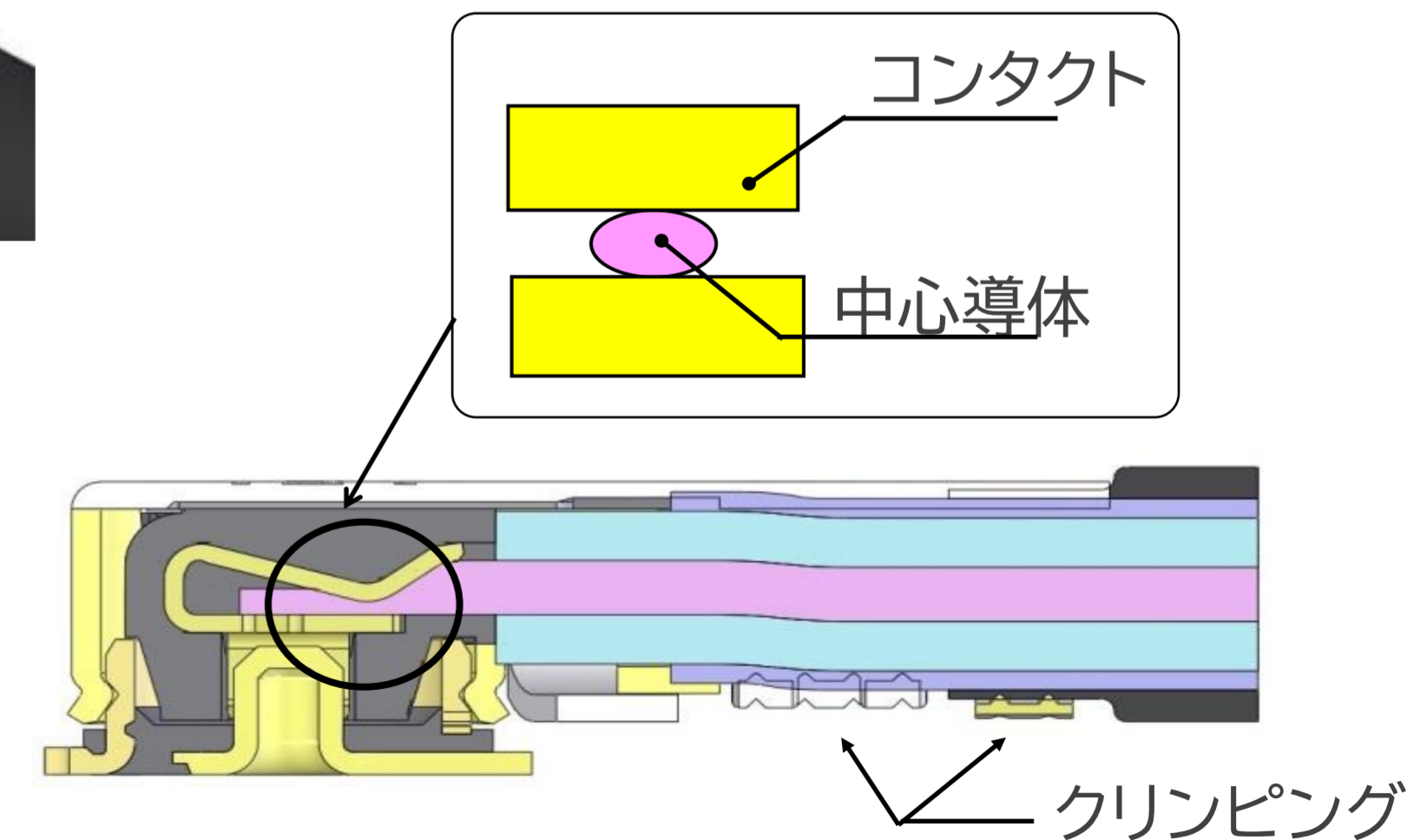
MHF[®] Harnesses

i-Fit[®] Technology: 無ハンダ結線テクノロジー



[i-Fit[®] technology](#) 動画をフル再生

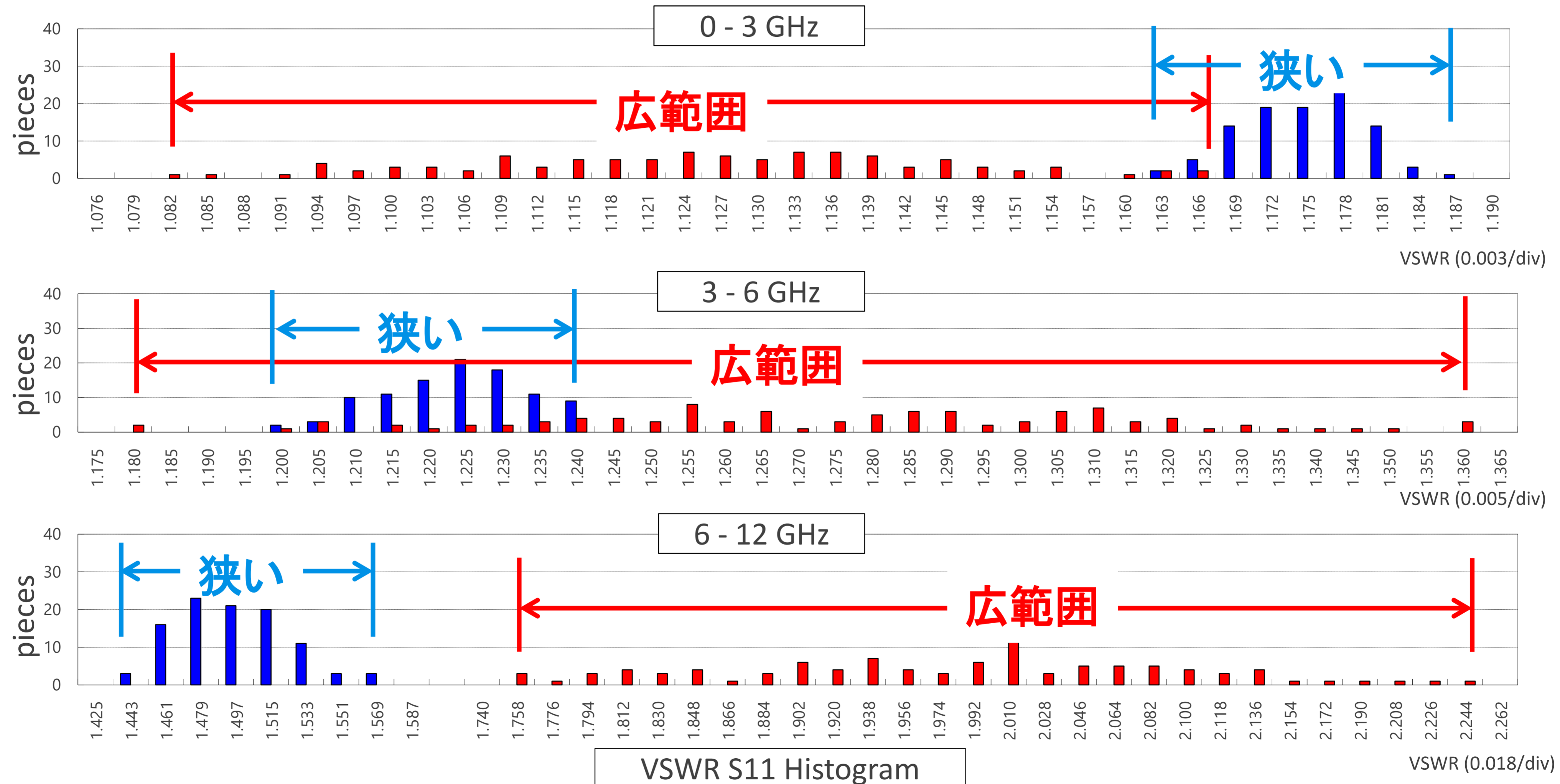
i-Fit[®]テクノロジーはI-PEX独自の結線方式であり、MHF[®]シリーズにおける最大の特徴です。無ハンダ結線のため、ハンダによる電気特性のばらつきを最小限に抑えることが可能です。製品ごとの個体差を無くすことで、均一の性能を持った製品をご提供いたします。



i-Fit[®] Technology: 無ハンダ結線によるメリット

i-Fit[®]による無はんだ結線=電気特性のばらつきが少ない

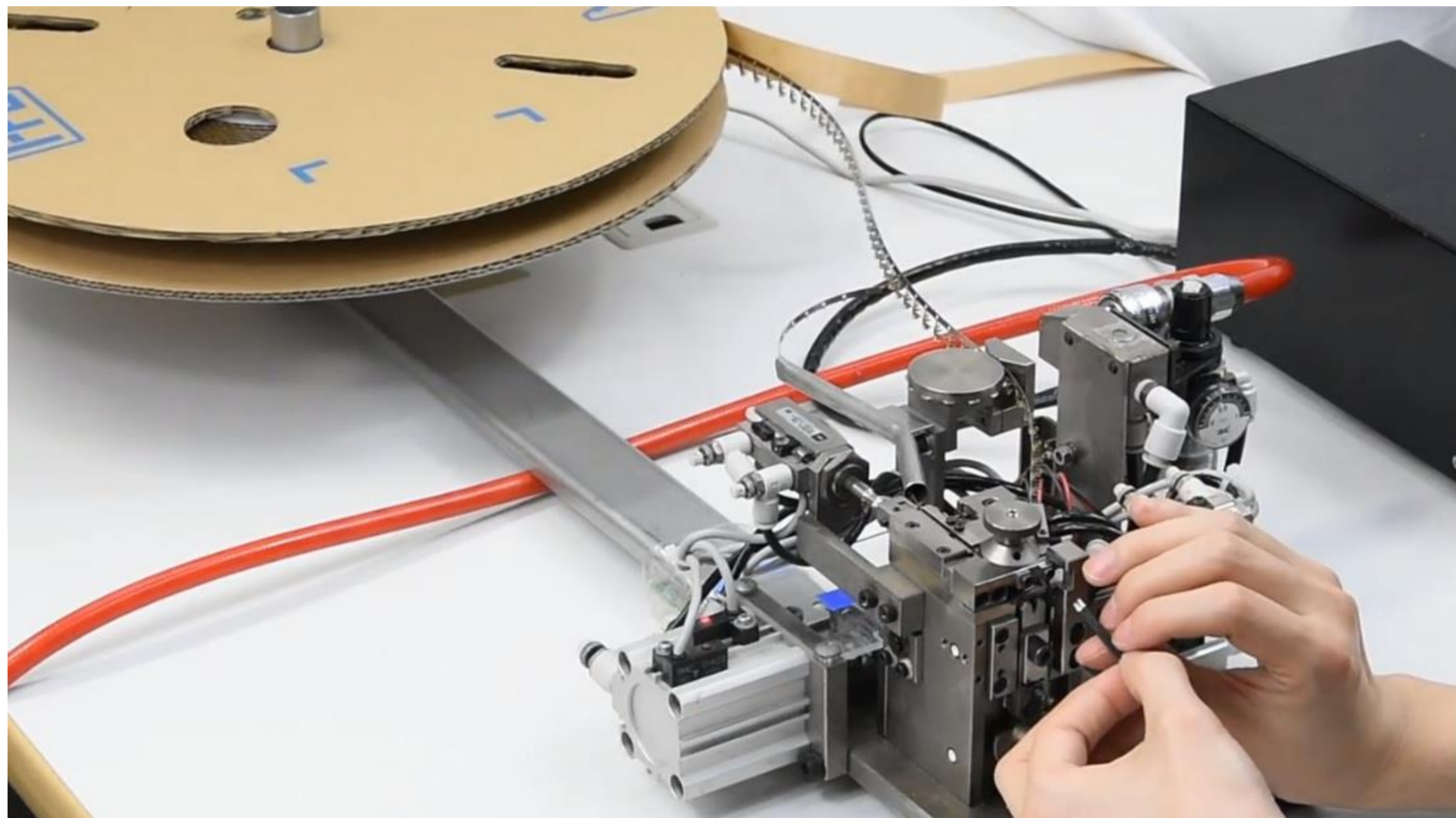
■ I-PEX i-Fit[®] Solderless termination (MHF[®]5)
 ■ Solder termination



i-Fit[®] Technology: 無ハンダ結線とマニュアルハンダ結線との比較

i-Fit[®]により、飛躍的なタクトタイム短縮

■ i-Fit[®] セミオート結線JIG



		I-PEX MHF [®] "i-Fit [®] "	手半田結線
タクトタイム	ケーブルストリップ	Same tact time	
	結線	6 seconds/ea.	30 seconds/ea.
結線端末数/月		105,600端末	21,120端末
必要人員	1Mケーブルアセンブリ/月	10	48
	2Mケーブルアセンブリ/月	19	95

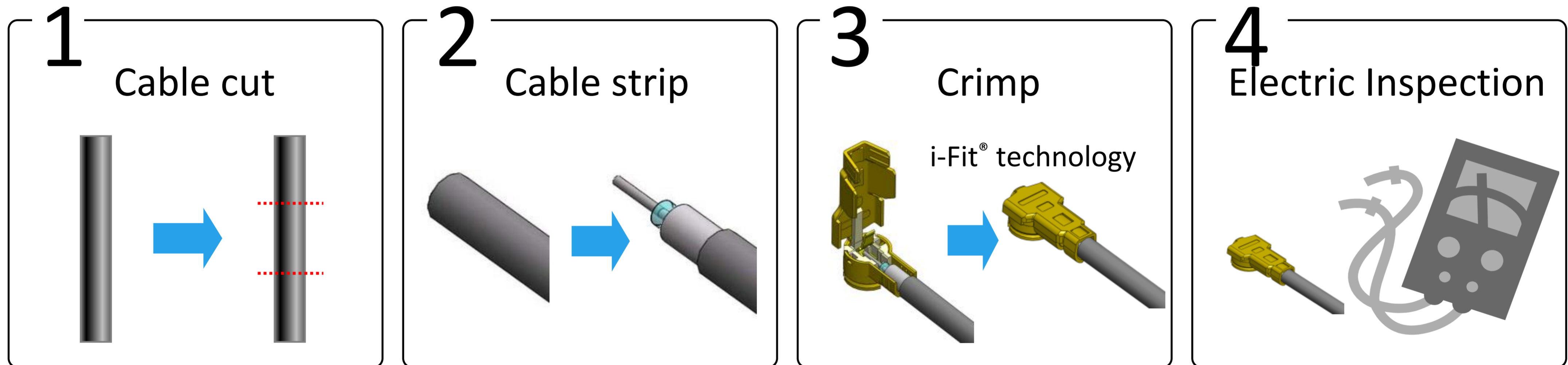
*一日8時間稼働・月間稼働日22日ベースでの試算

結線作業の容易なi-Fit[®]テクノロジーによりI-PEXのMHF[®]は、世界中のアンテナメーカー様やハーネスメーカー様にご採用いただいております。I-PEXは全世界の100社を超えるお客様に1,000台以上の結線装置を出荷しており、数多くのMHF[®]プラグコネクタが採用されたケーブルハーネスやアンテナが市場に出荷されております。



MHF[®] Harness Assemblies : ケーブルハーネス品での供給が可能

I-PEXはi-Fit[®] technology搭載の完全自動機による、ケーブルハーネス品供給が可能

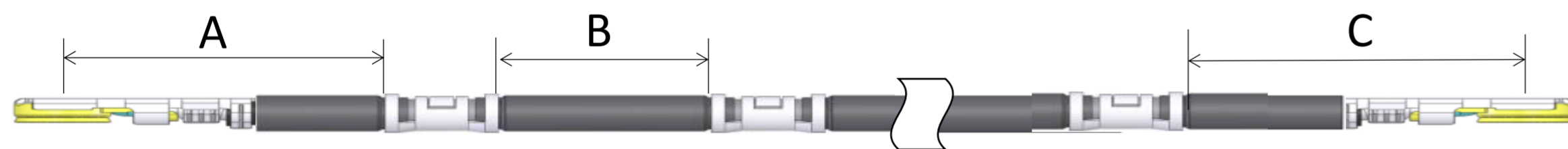
Fully Automated Process



MHF[®] Harness Assemblies : ケーブル用クランプ / SMTクリップ

		Grounding clamp 3mm length	Grounding clamp 6mm length	Clip for grounding clamp MP-A series
Appearance (Reference)				
Coax O.D. (Center Conductor AWG)	1.37 mm (30)	●	●	● MP-A04 (P/N 3224-0001)
	1.13 mm (32)	●	●	● MP-A02 (P/N 3182-0001)
	0.81 mm (36)	●	●	● MP-A01 (P/N 3096-0001)
	0.64 mm (36)	●	●	● MP-A03 (P/N 3186-0001)

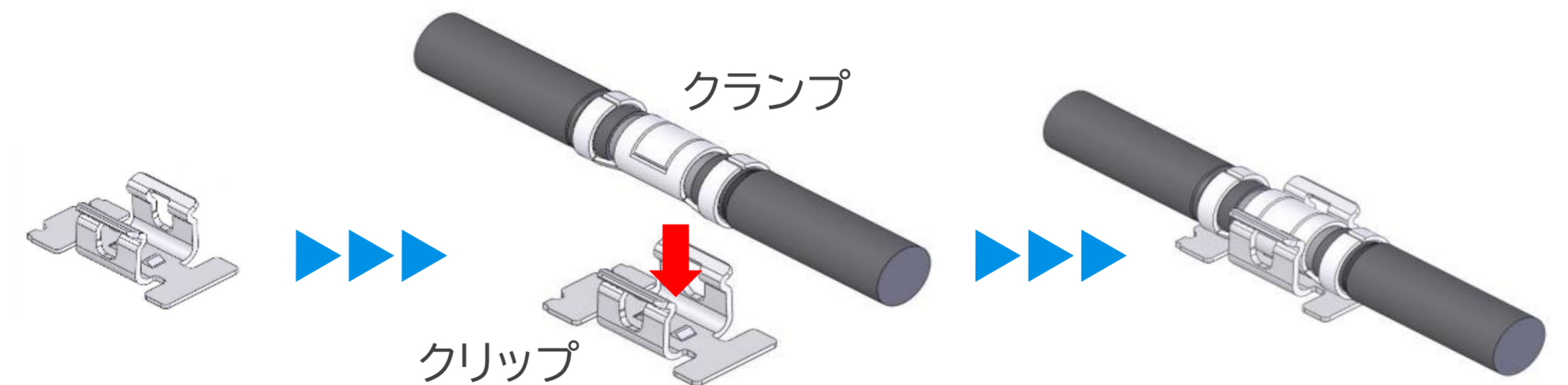
クランプ間の最短距離



A	B	C
12mm min.	10mm min.	10mm min.

※ハーネスの仕様によっては、この条件が当てはまらない場合があります。詳細は営業へお問い合わせください。

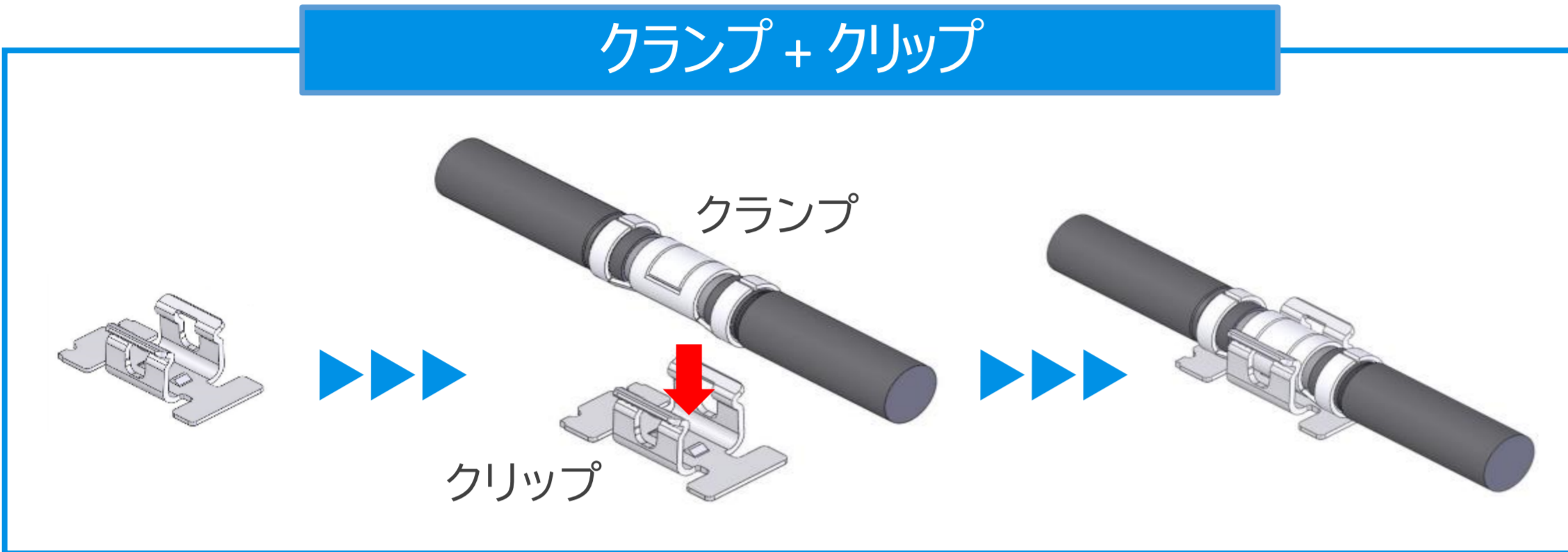
クランプ+クリップ



クリップは表面実装用にテープ&リールにパッケージ化

MHF[®] Harness Assemblies : ケーブル用クランプ / SMTクリップ

クランプ+クリップ

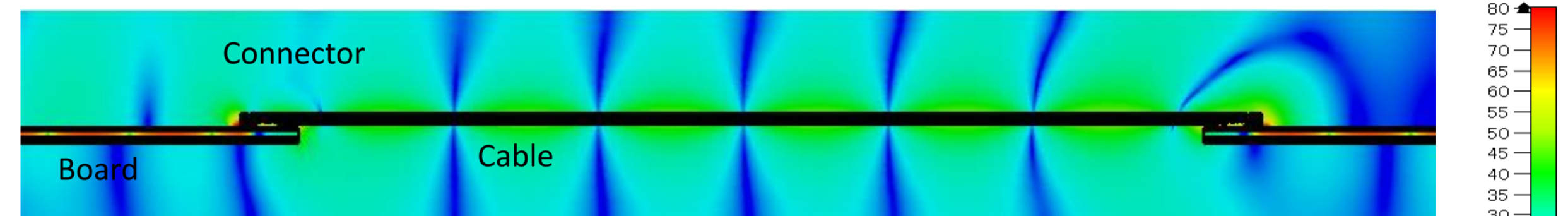


EMI対策に最適

5G mmWave アプリケーションに最適

Electric Field Simulations

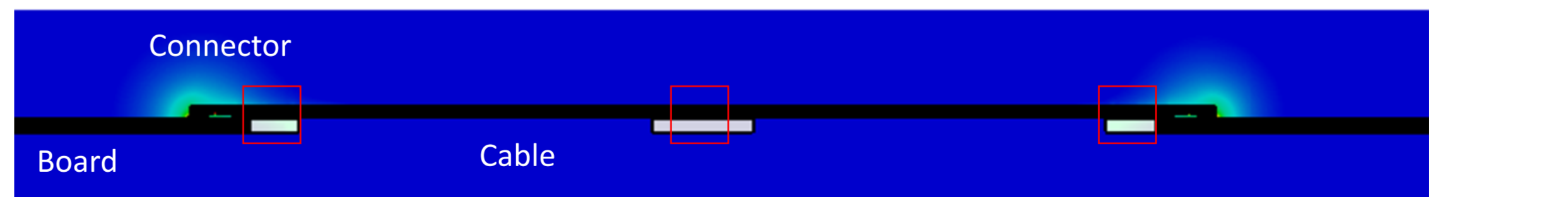
MHF[®] 4L Harness (クランプ & クリップ無し)



MHF[®] 7S Harness (クランプ & クリップ無し)

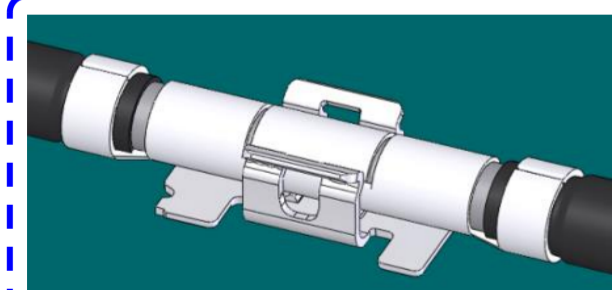


MHF[®] 7S Harness (クランプ & クリップ有り) □ : クランプ & クリップ

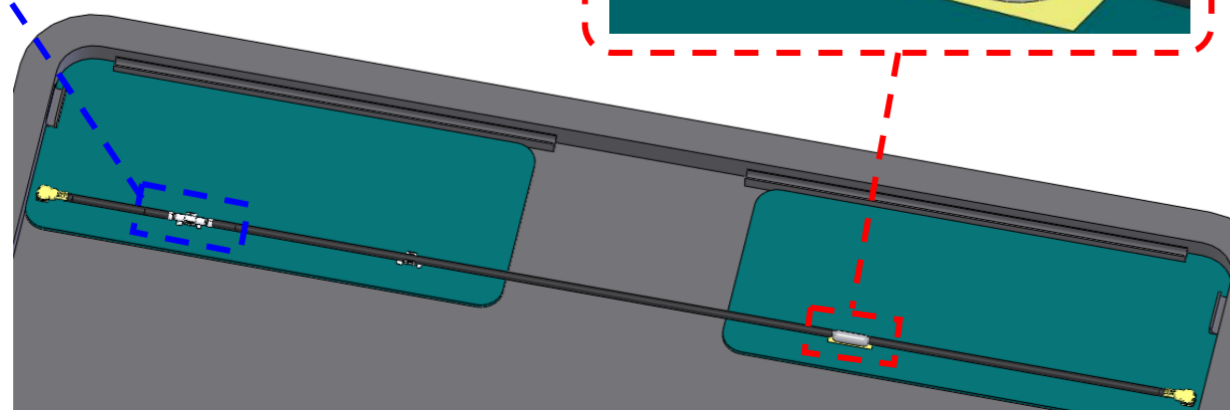
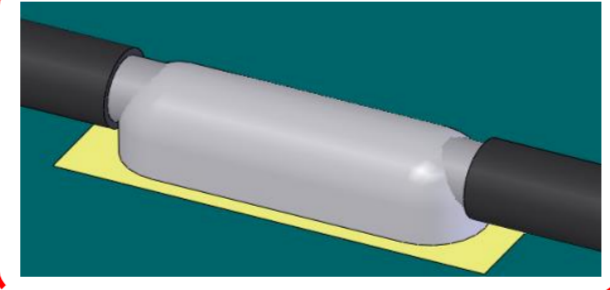


組立やリワークの工数削減

MP-A & クランプ

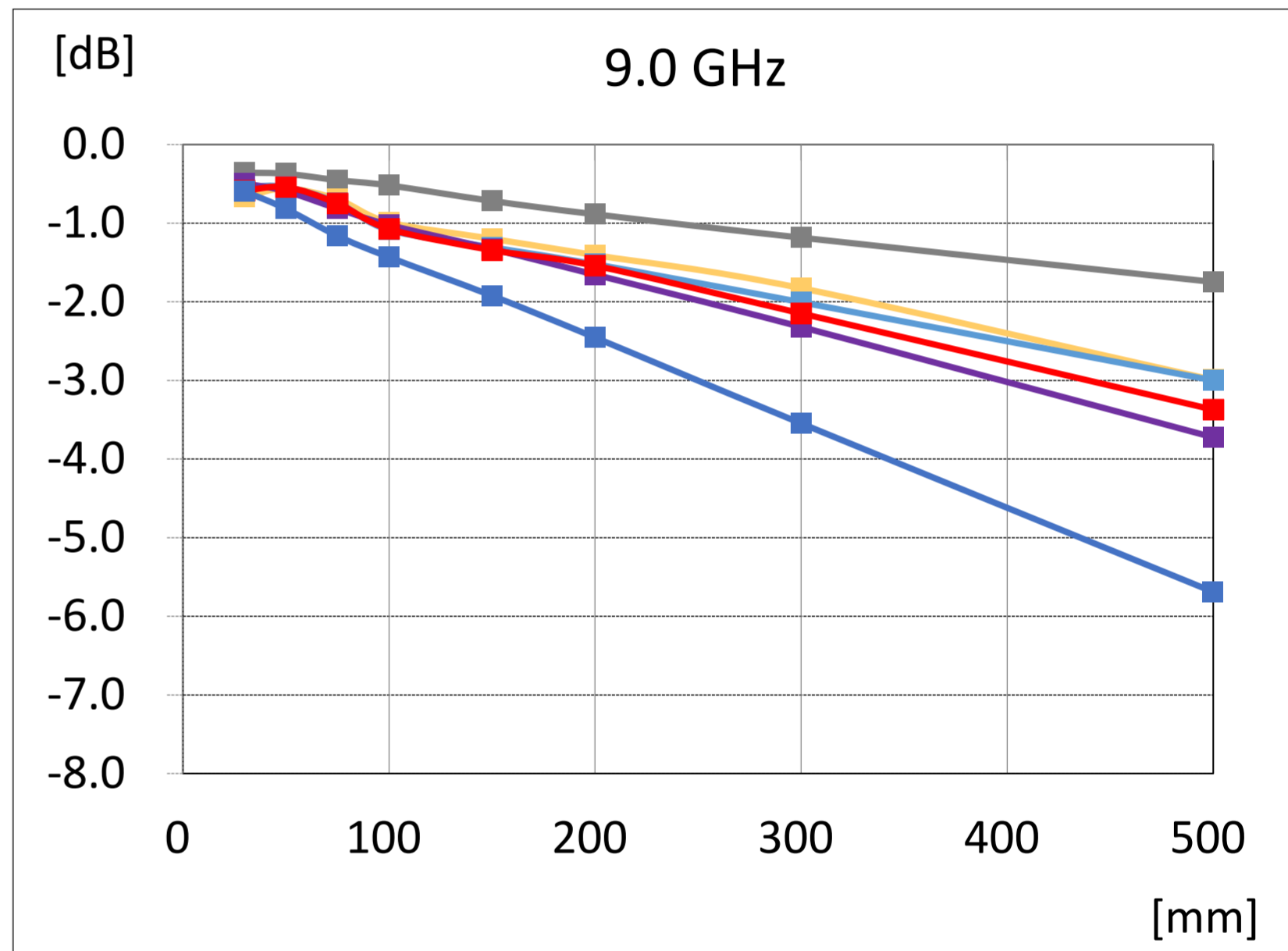
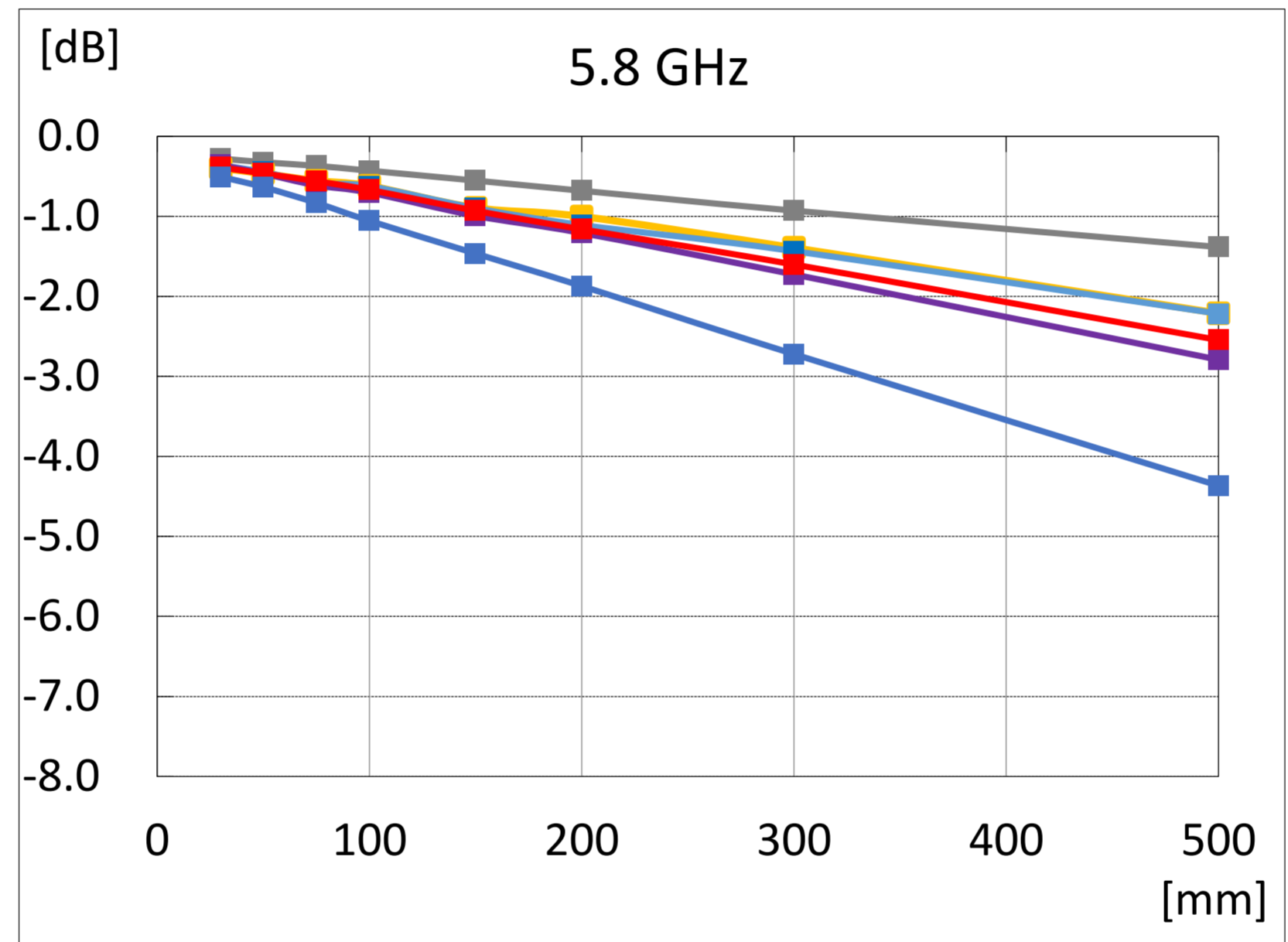
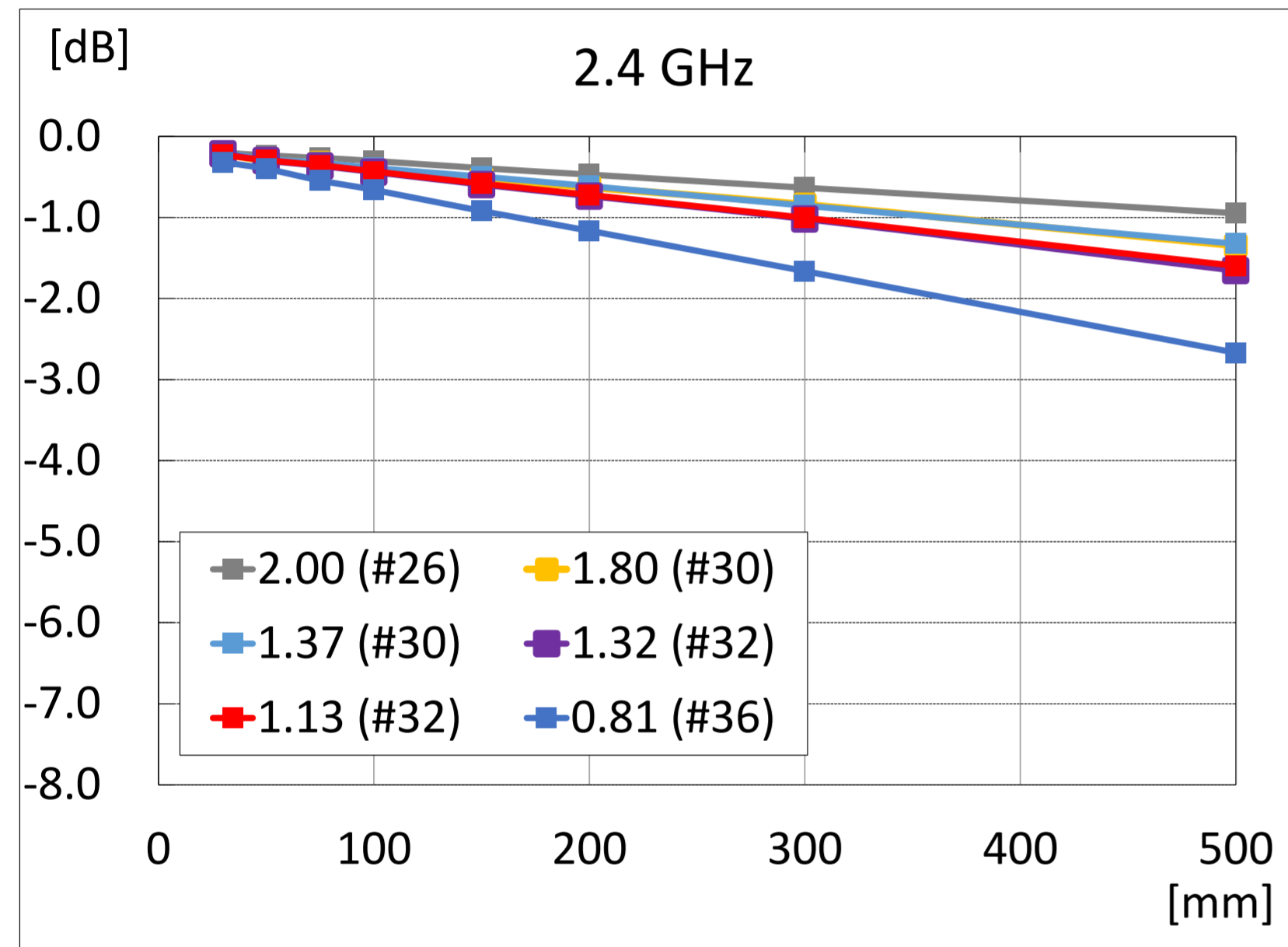


ハンダ



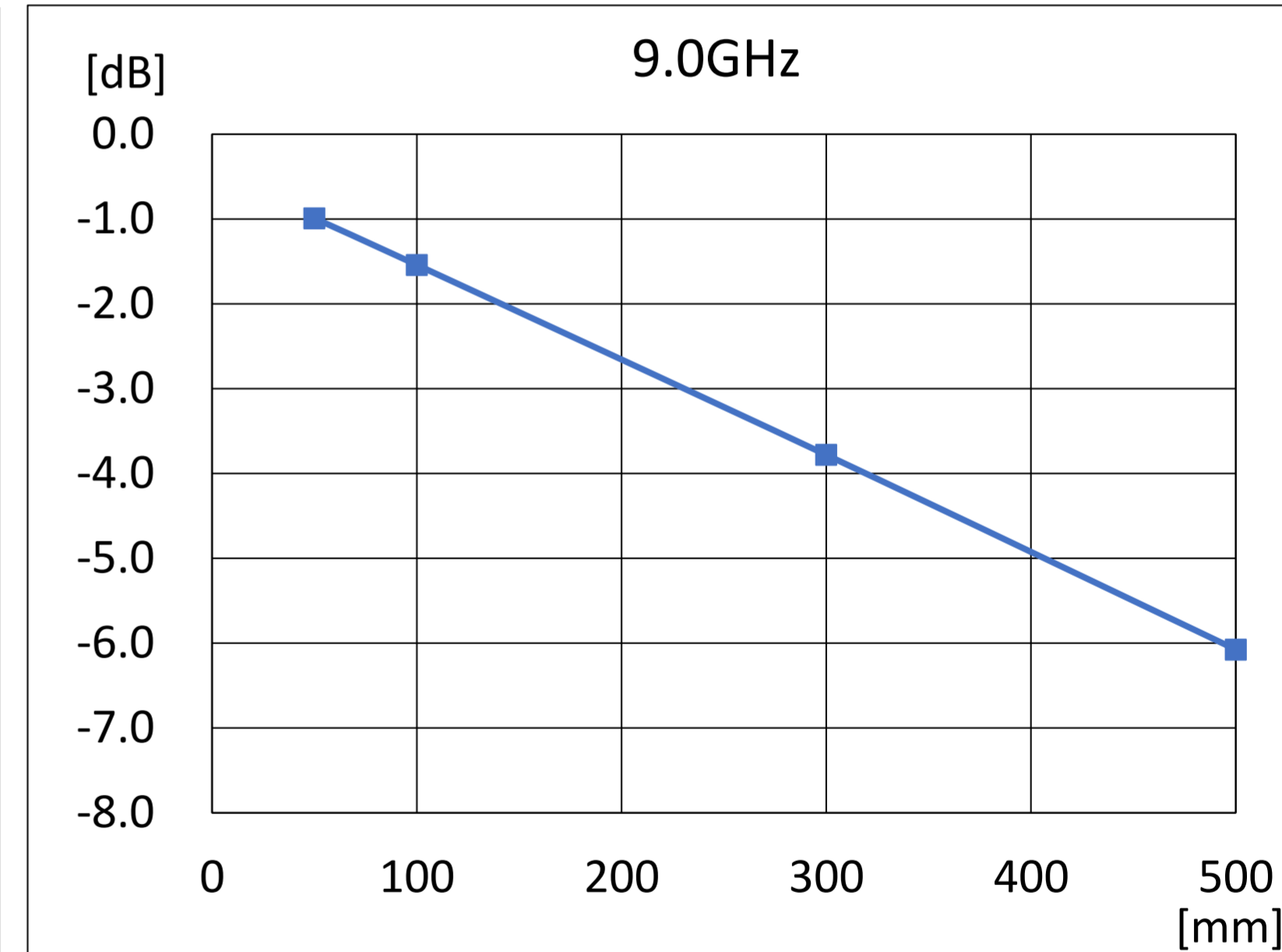
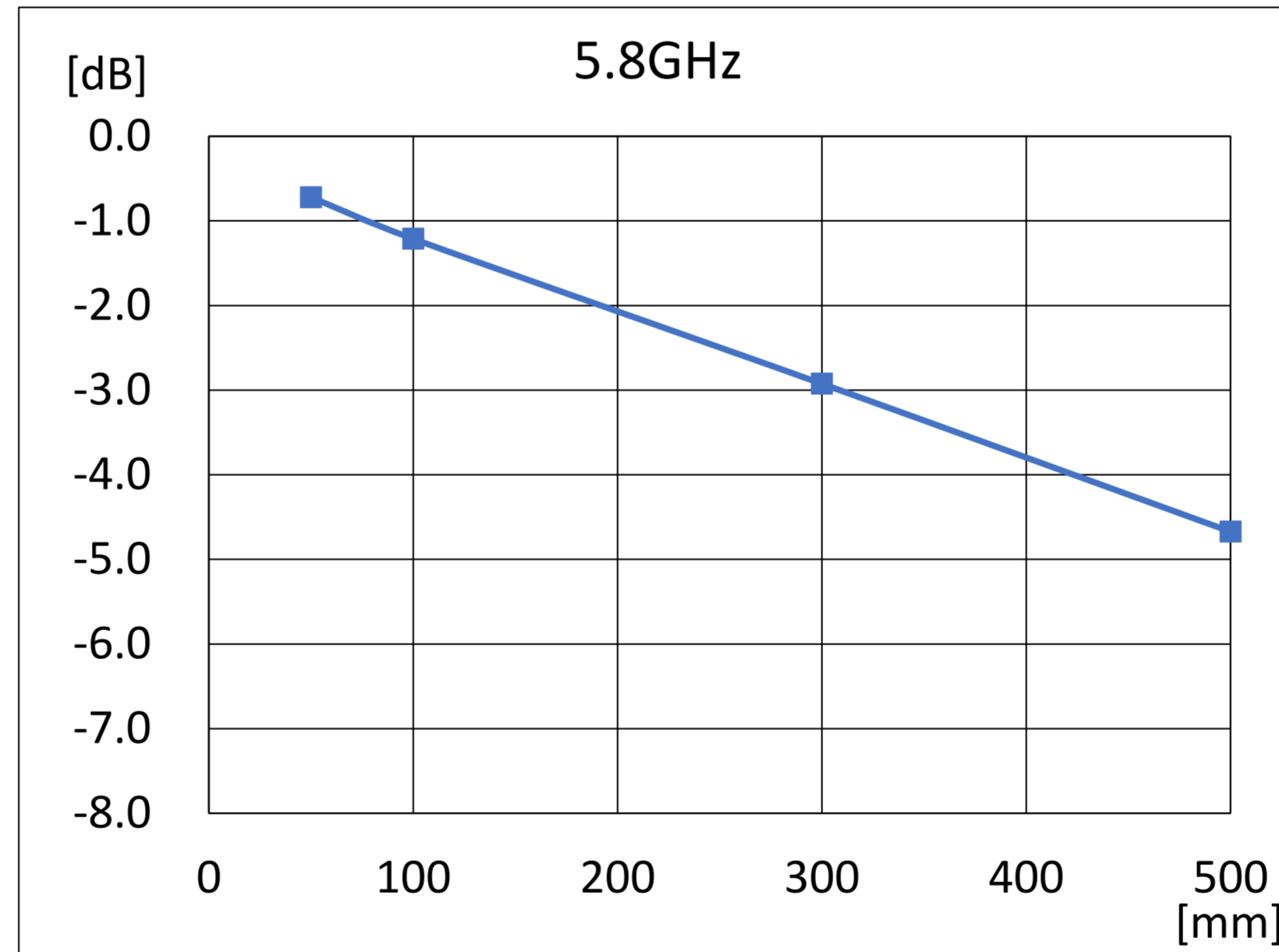
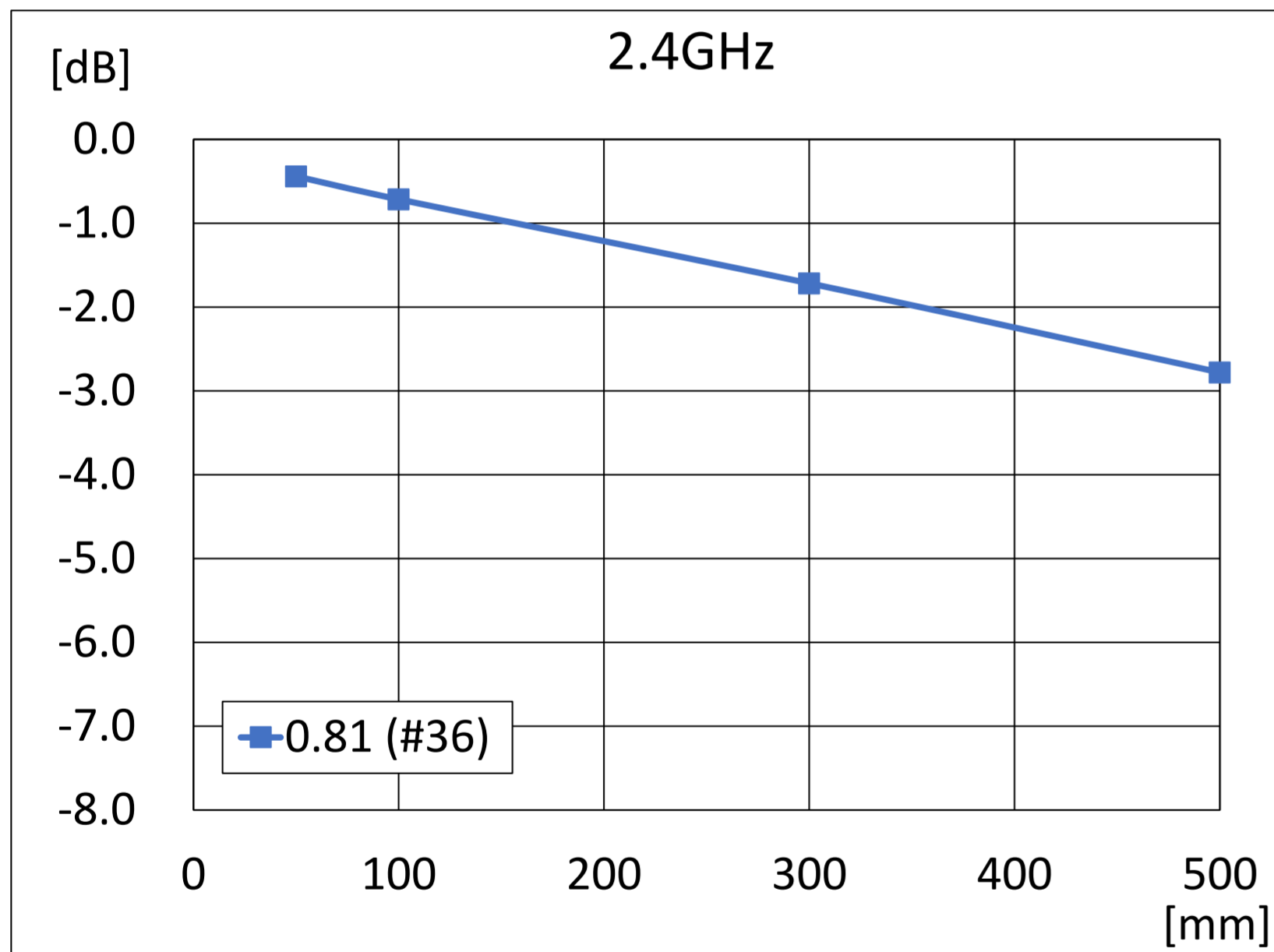
挿入損失 : MHF[®] I

■ Harness Length (mm) vs Insertion Loss (S21)



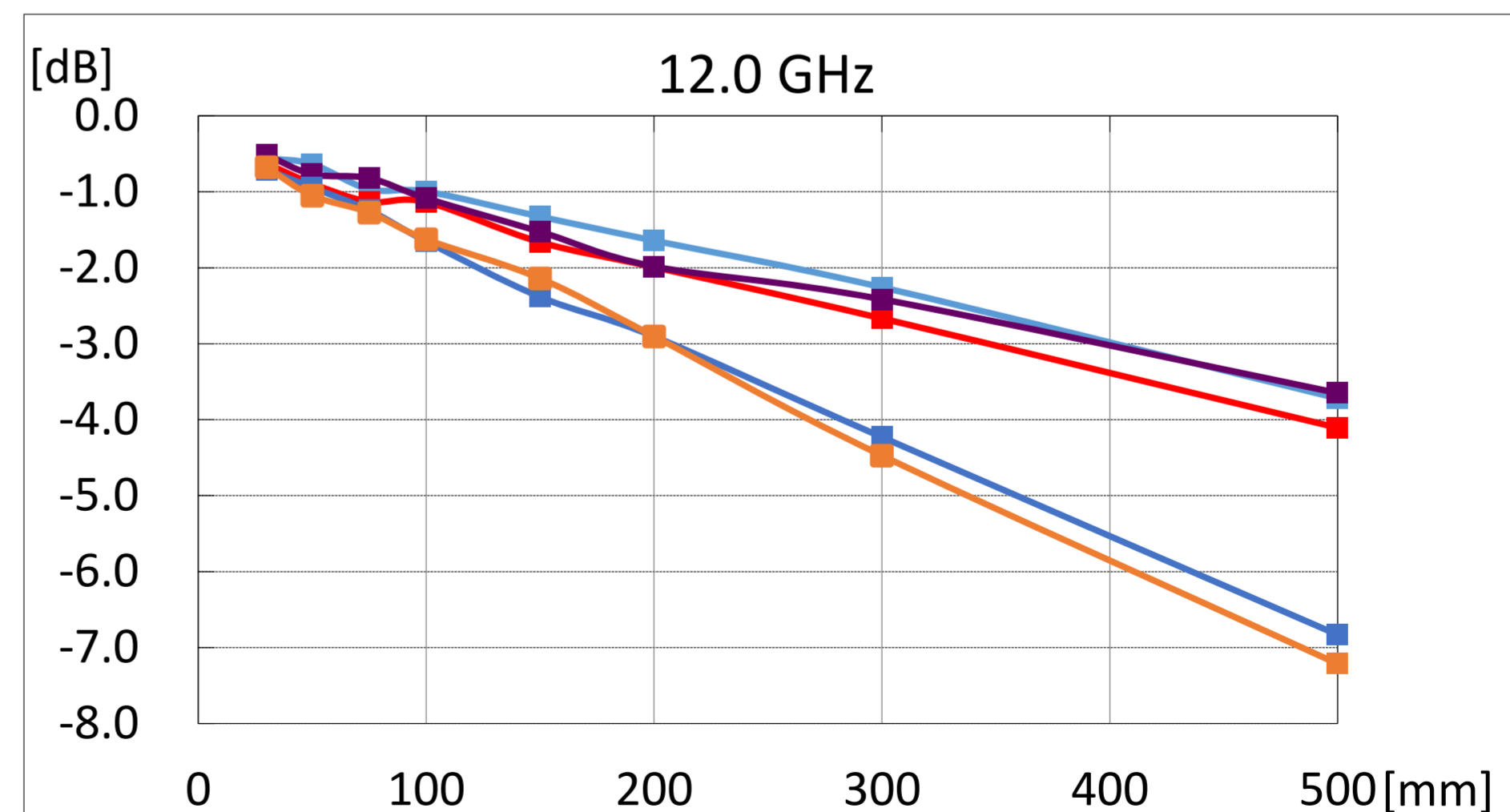
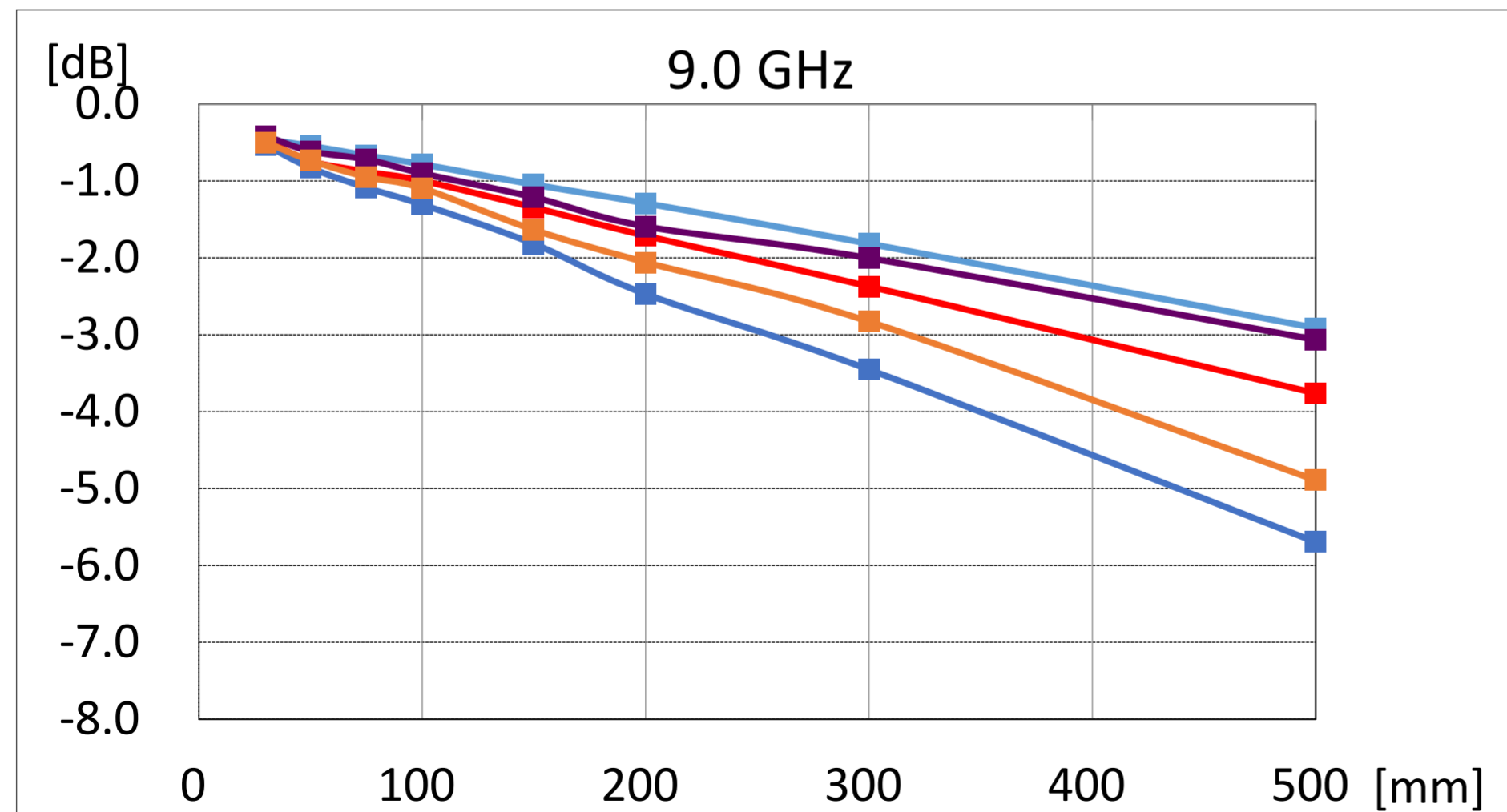
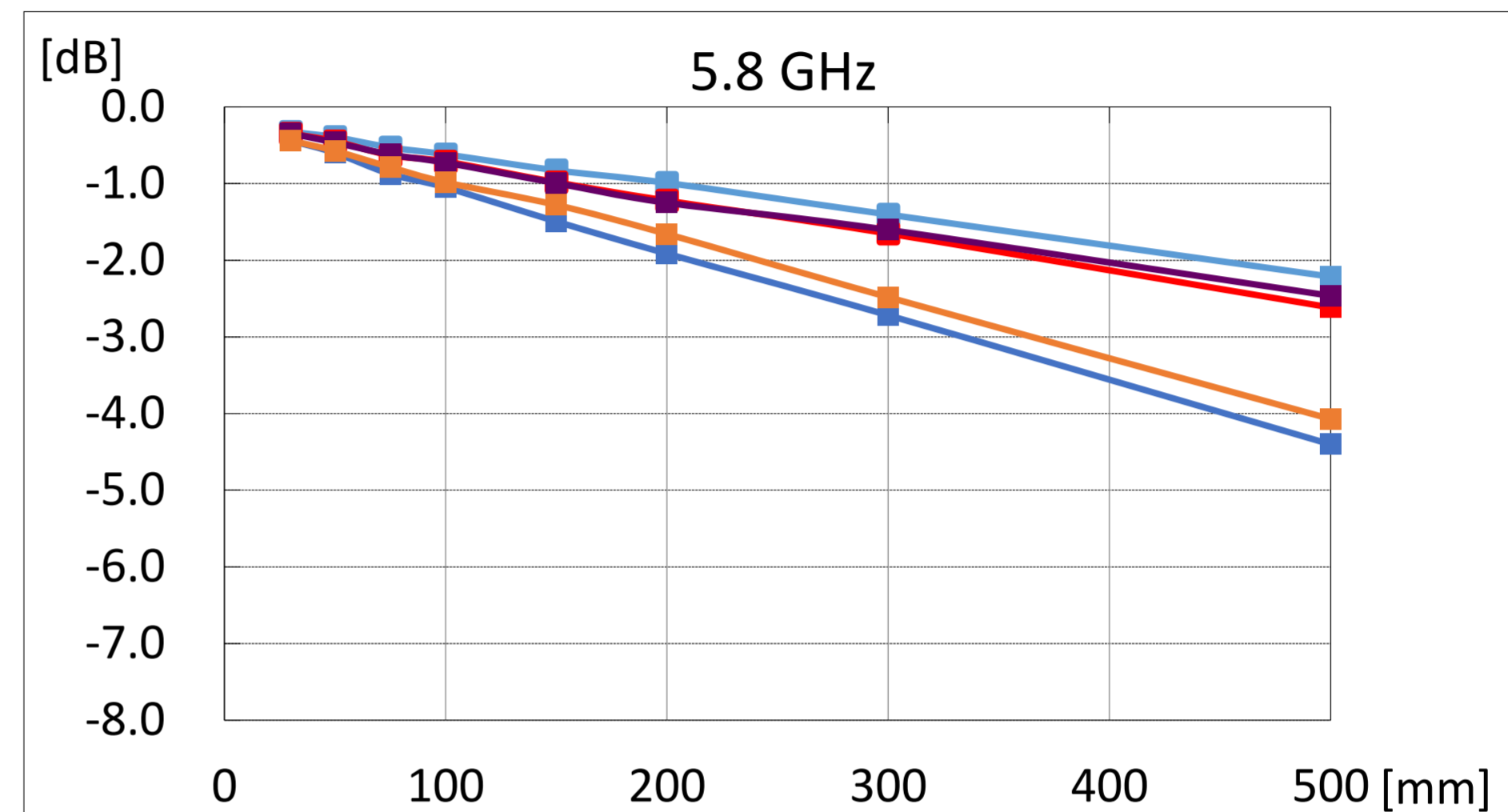
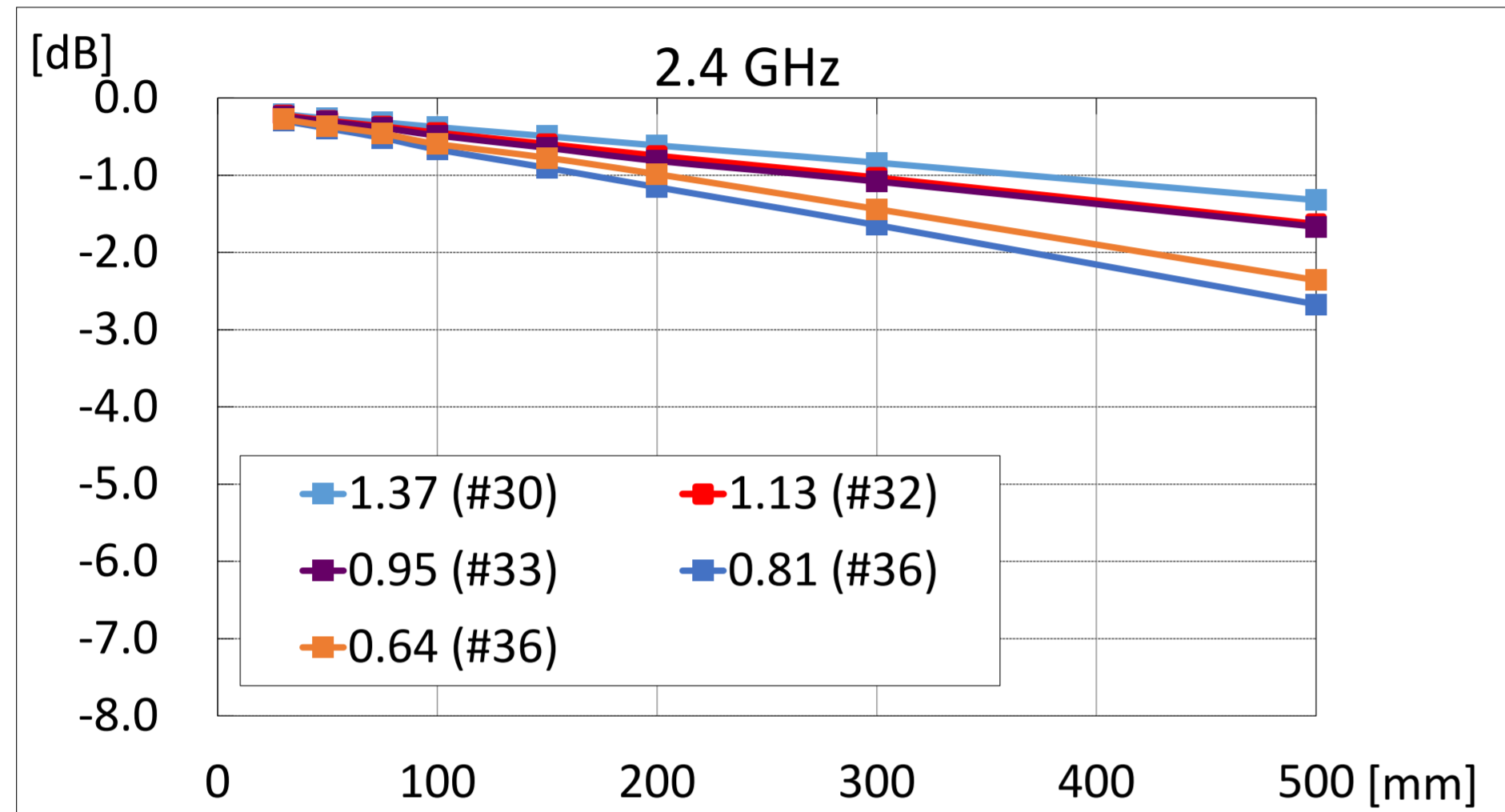
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■ Harness Length (mm) vs Insertion Loss (S21)



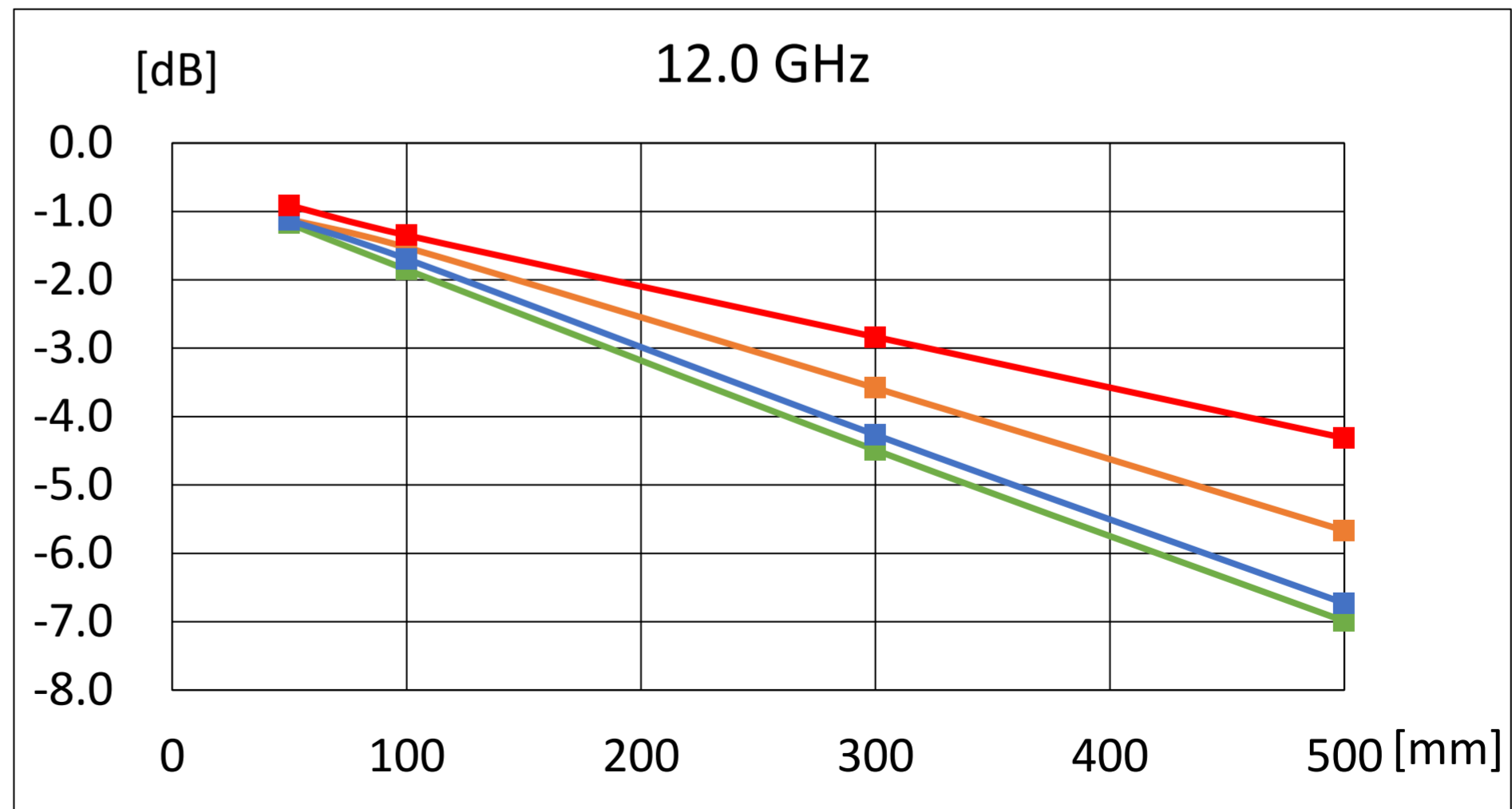
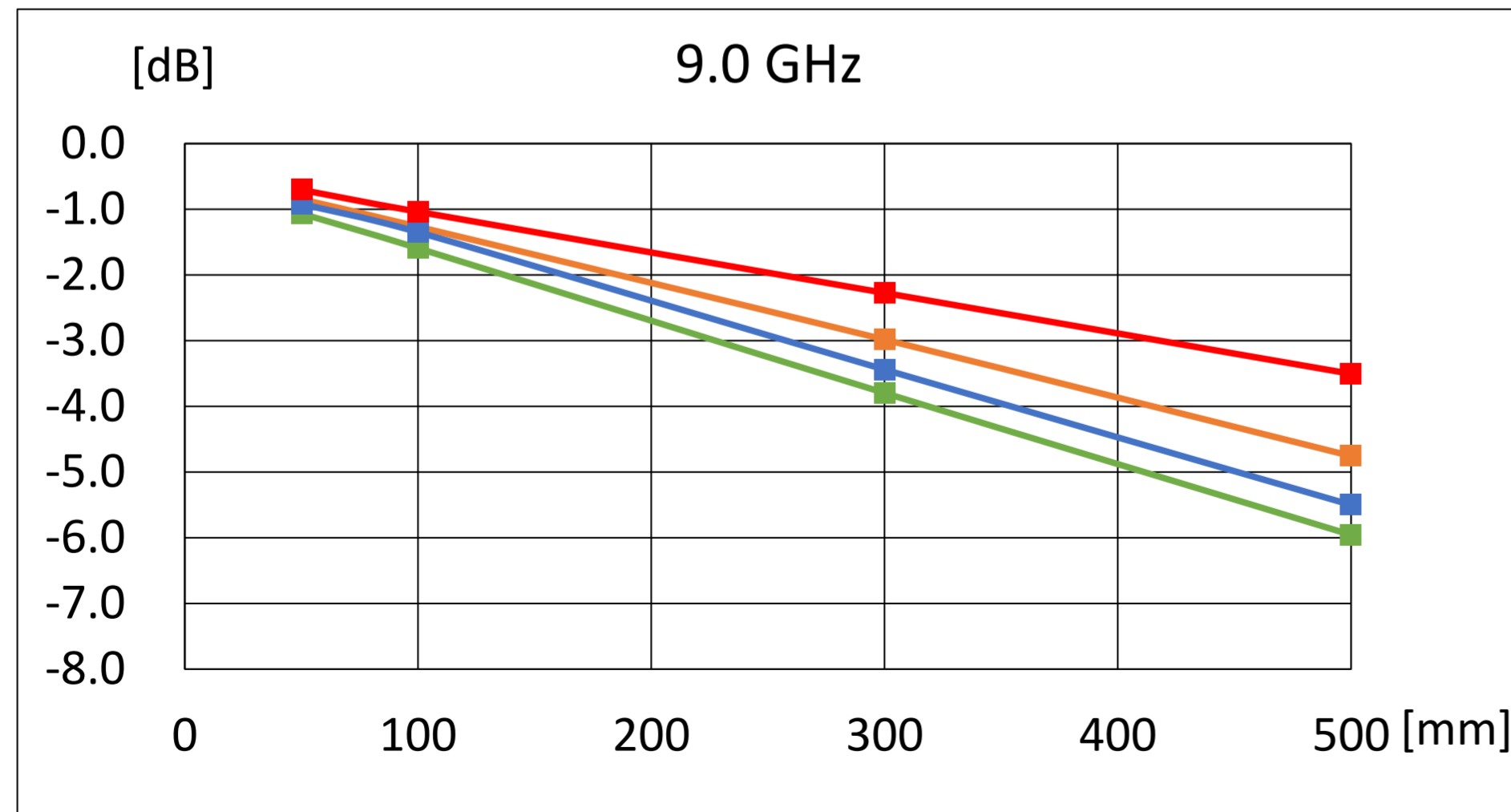
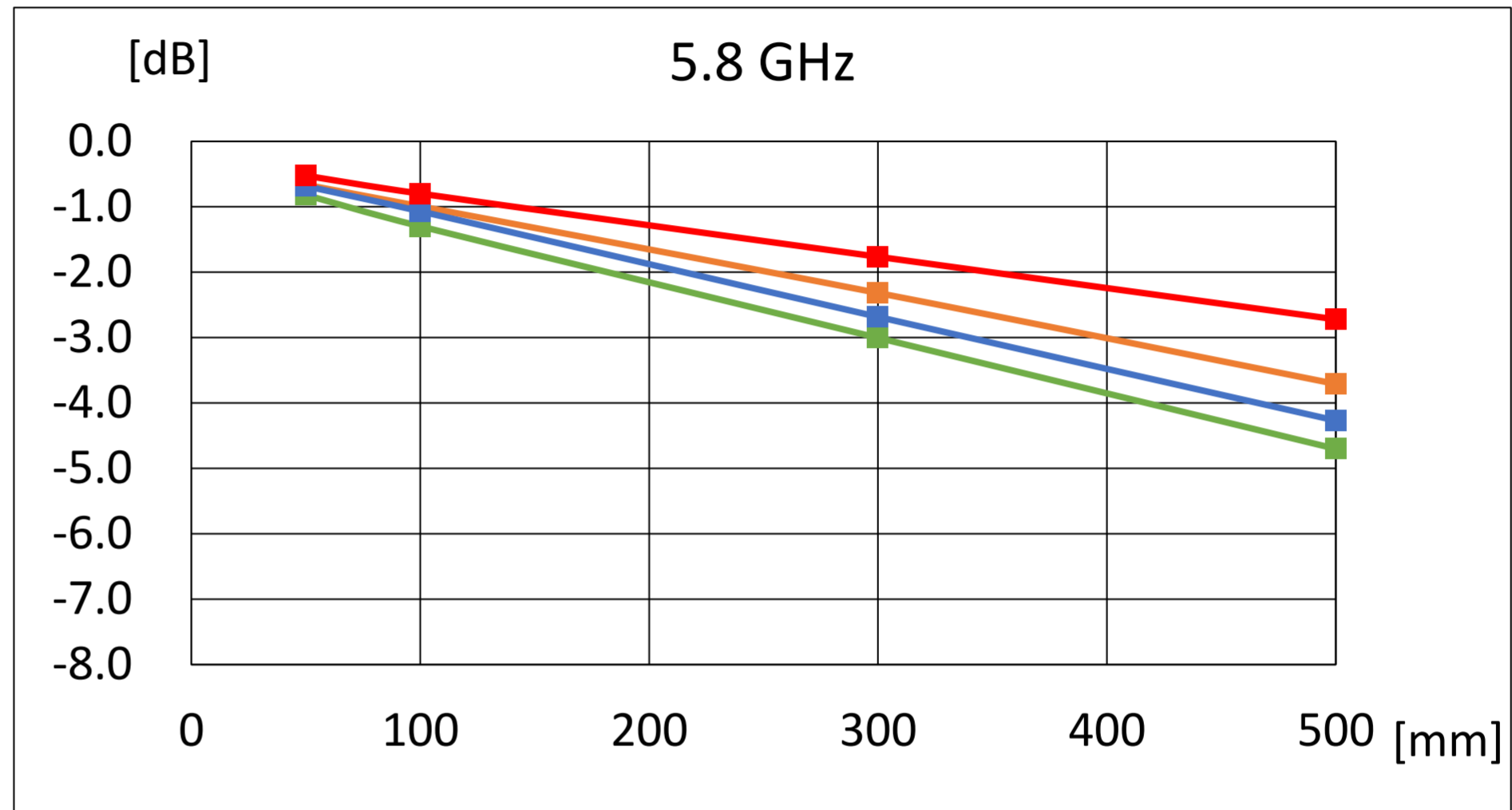
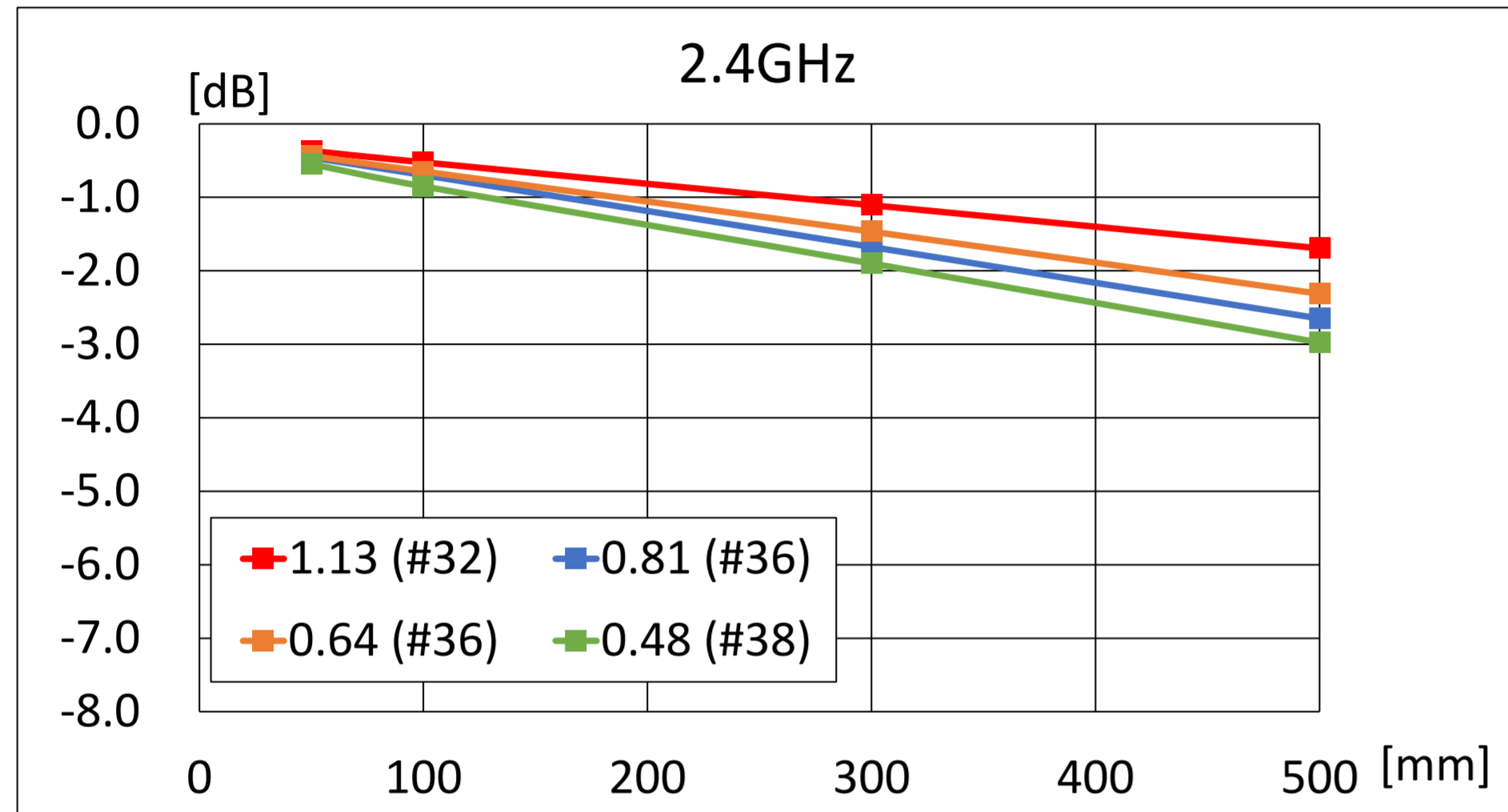
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■ Harness Length (mm) vs Insertion Loss (S21)



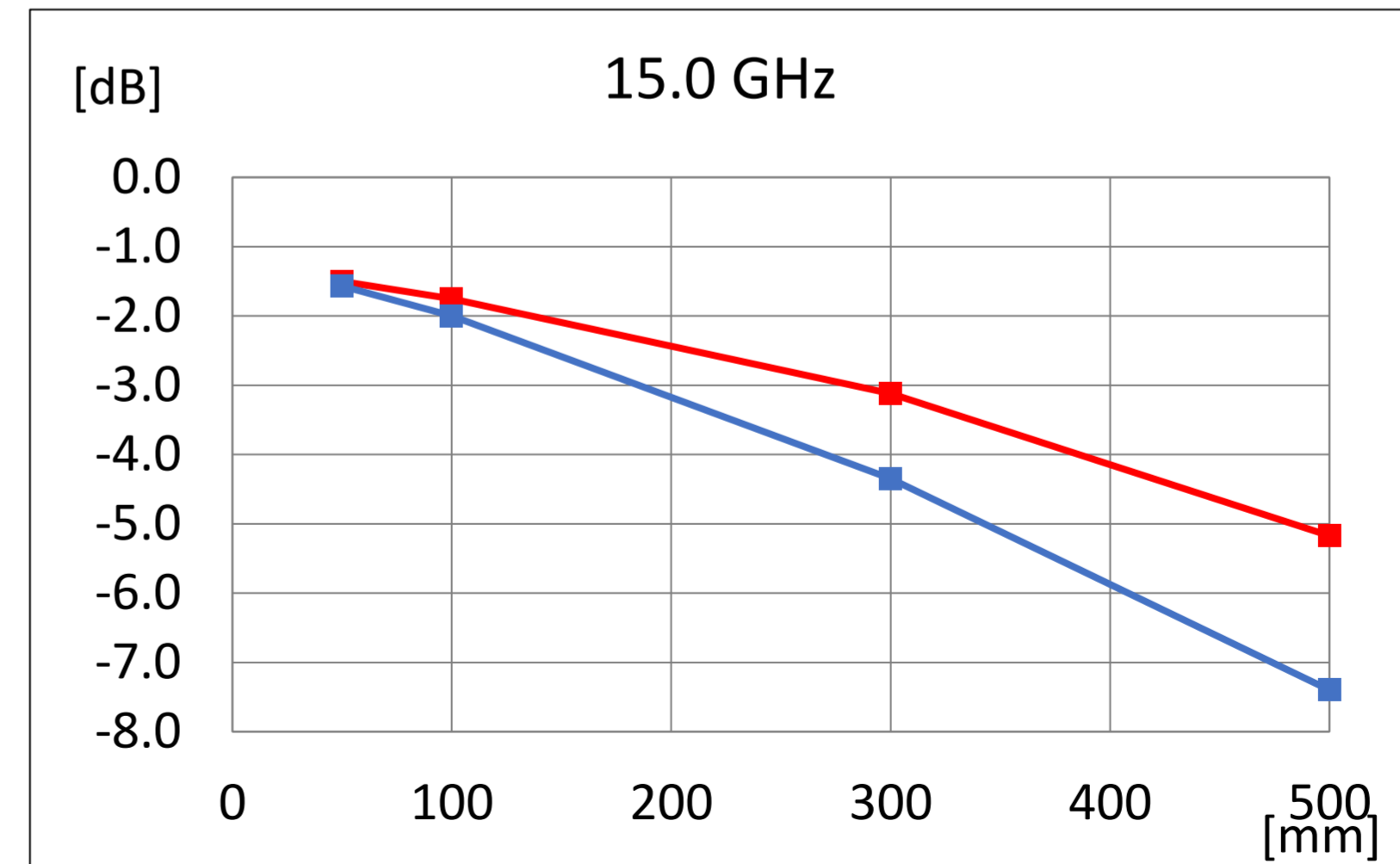
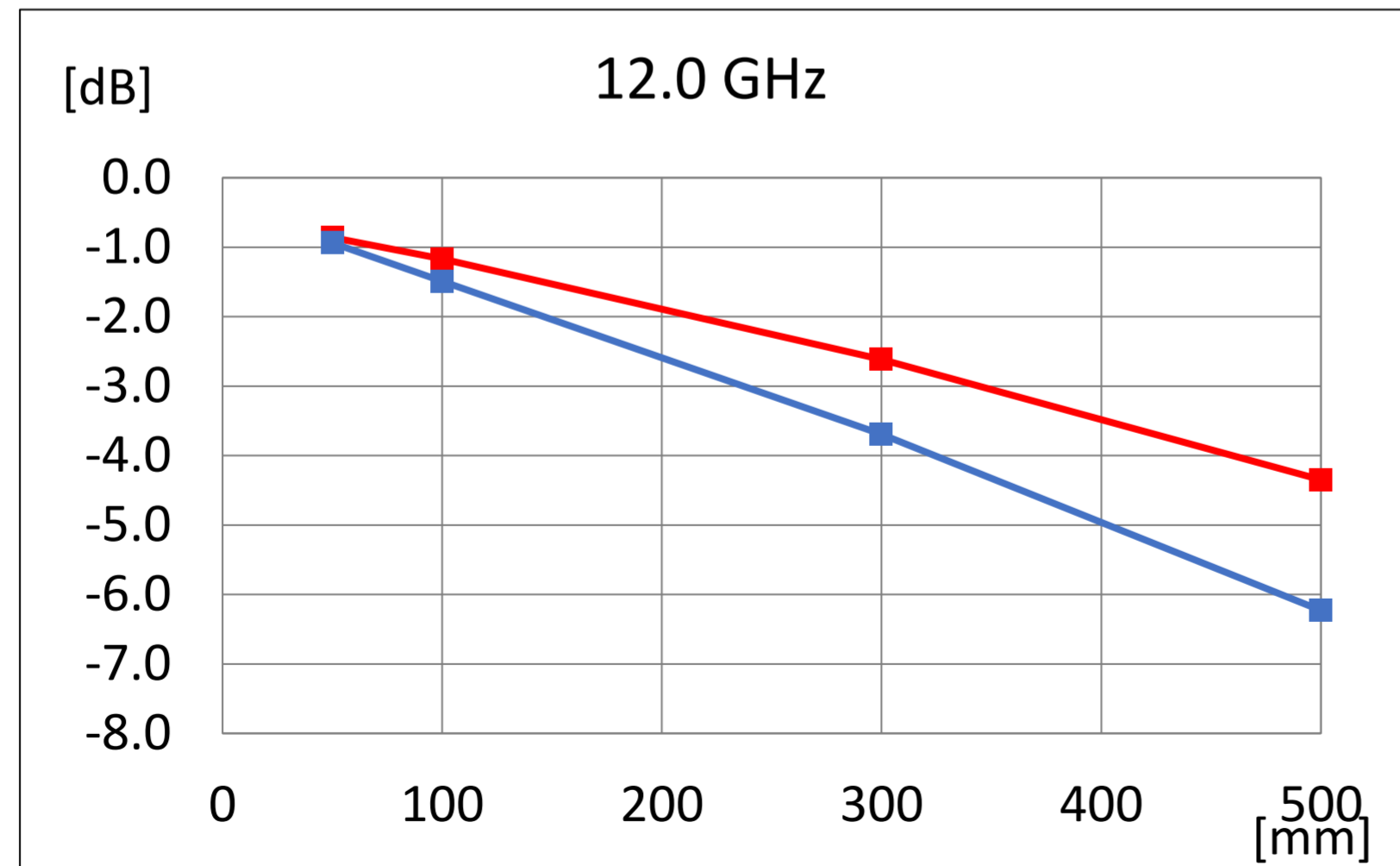
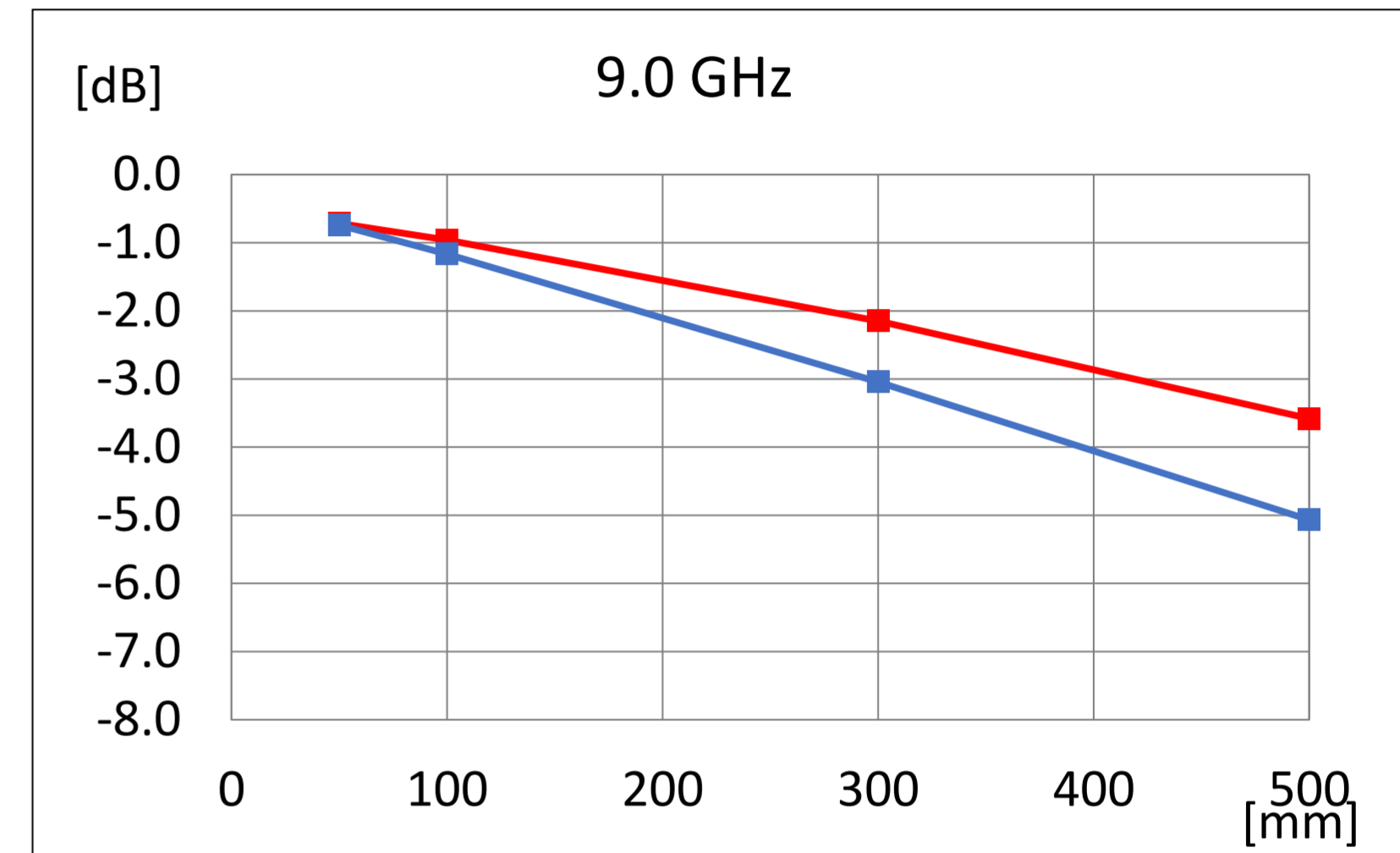
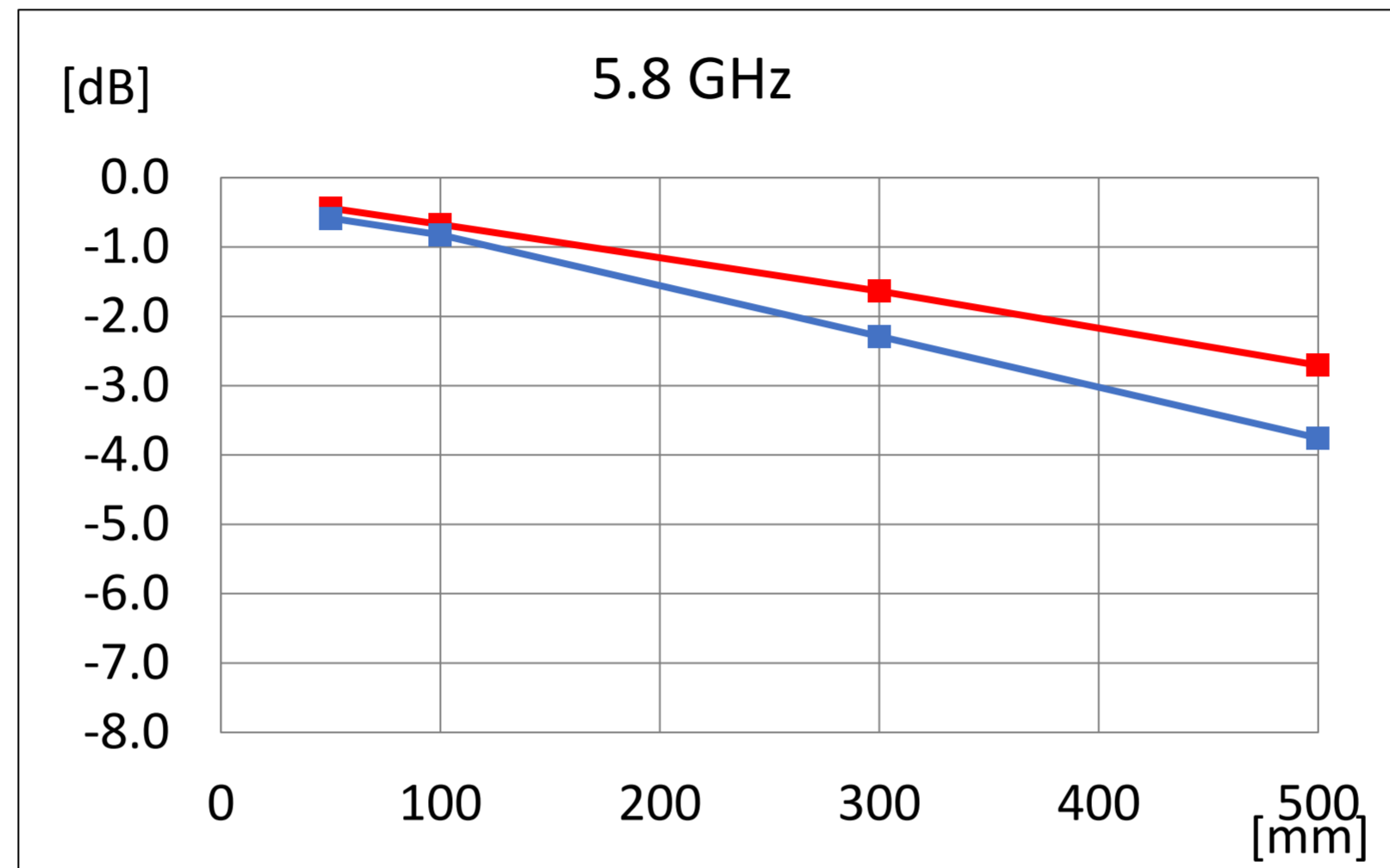
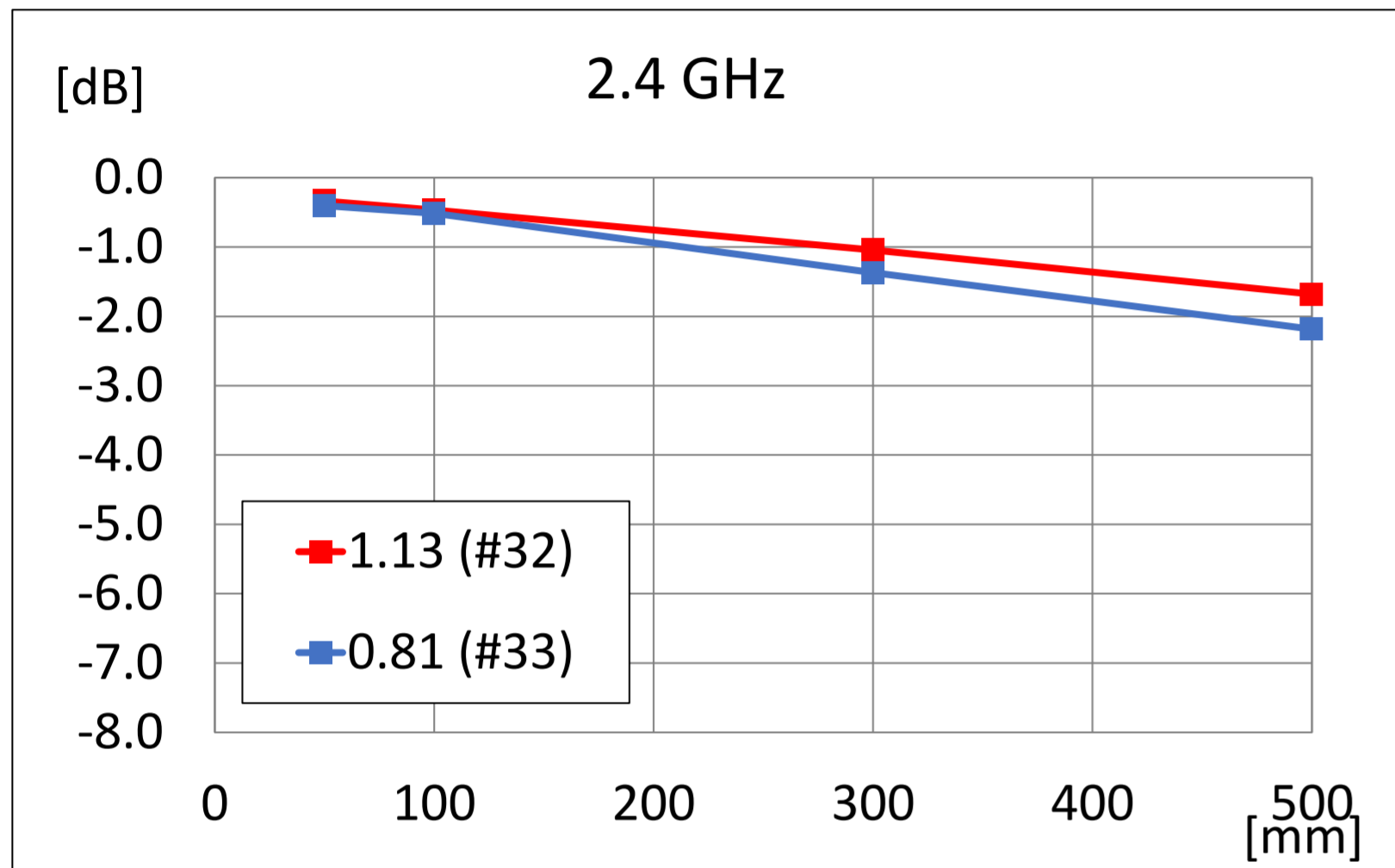
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■ Harness Length (mm) vs Insertion Loss (S21)



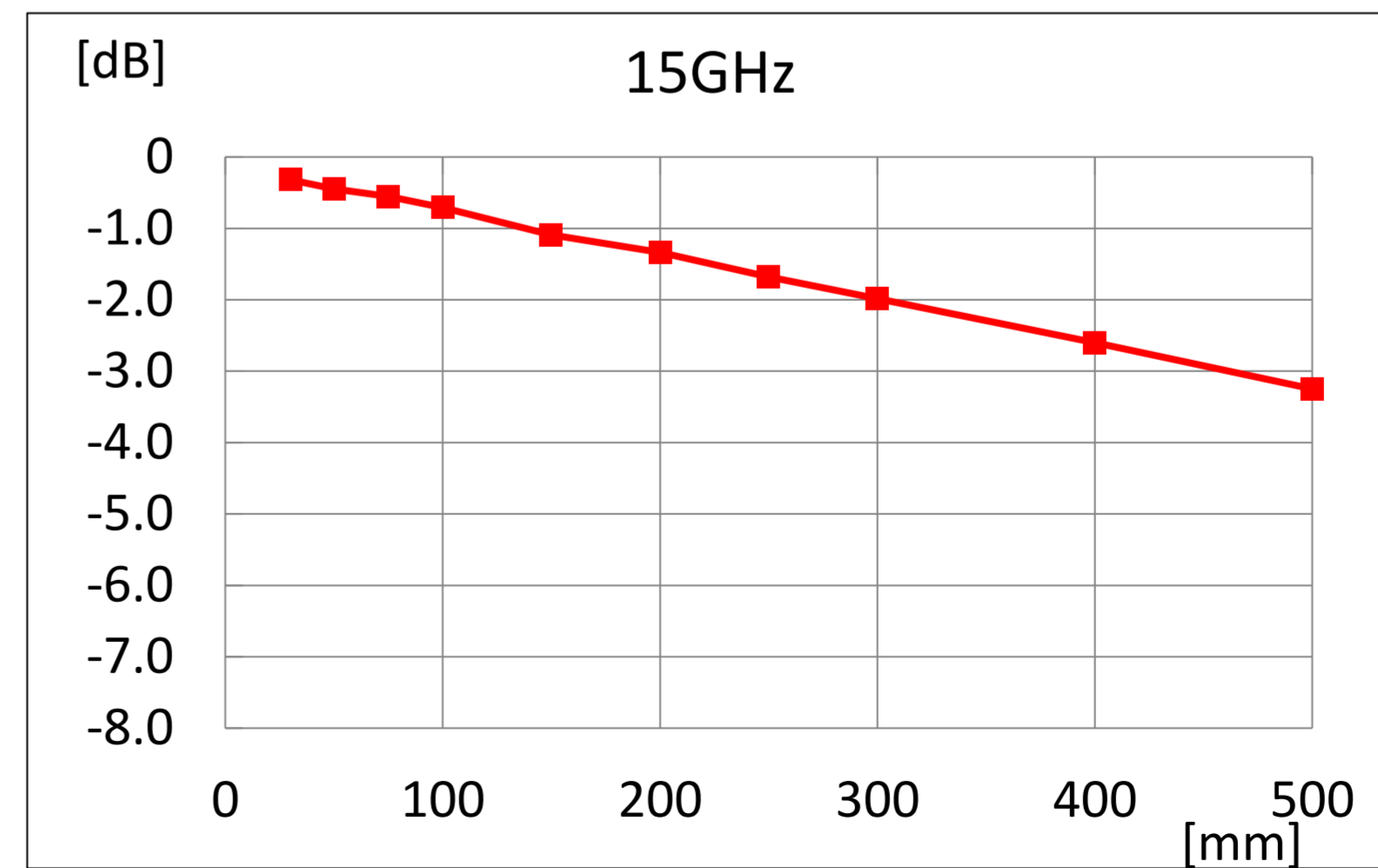
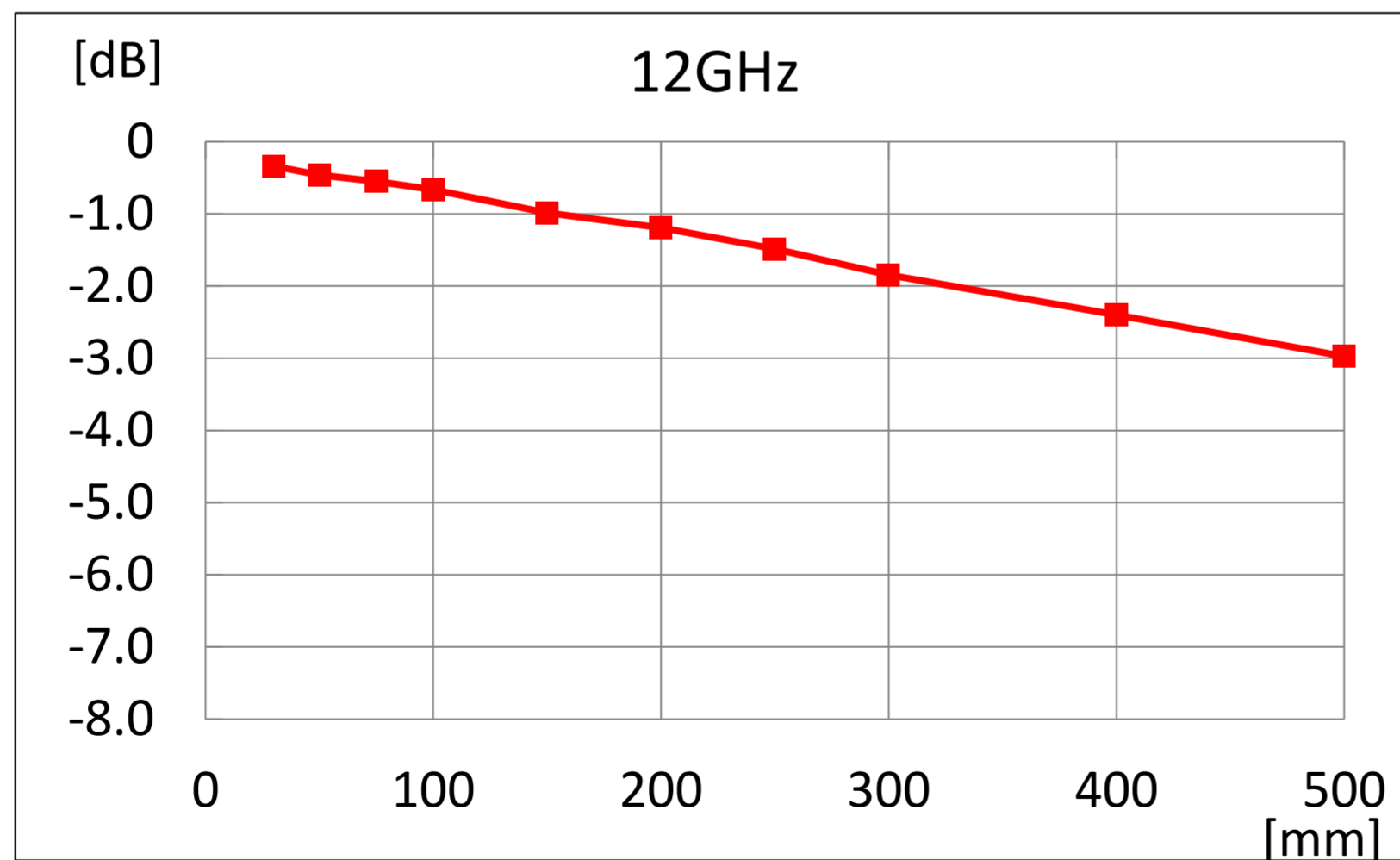
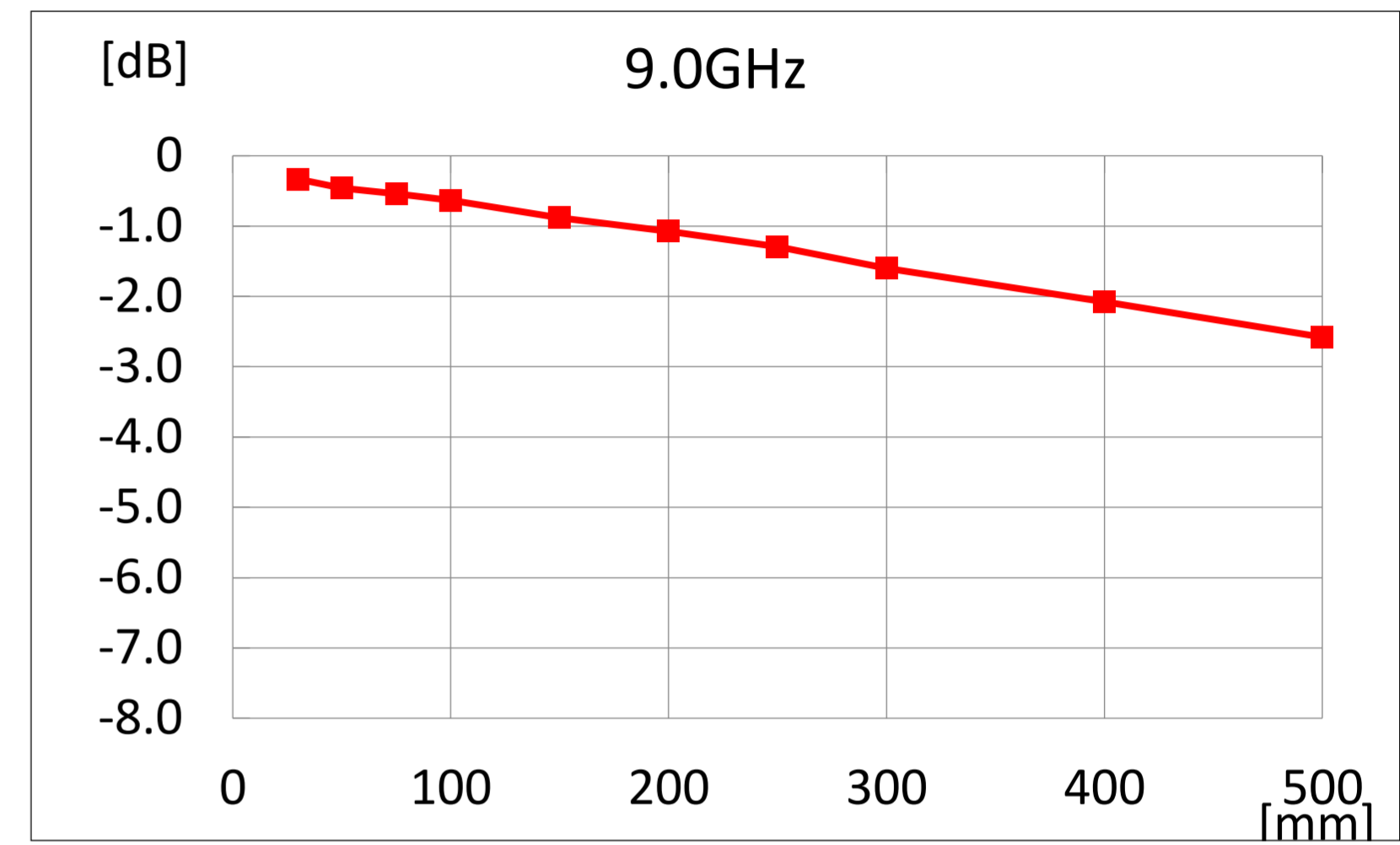
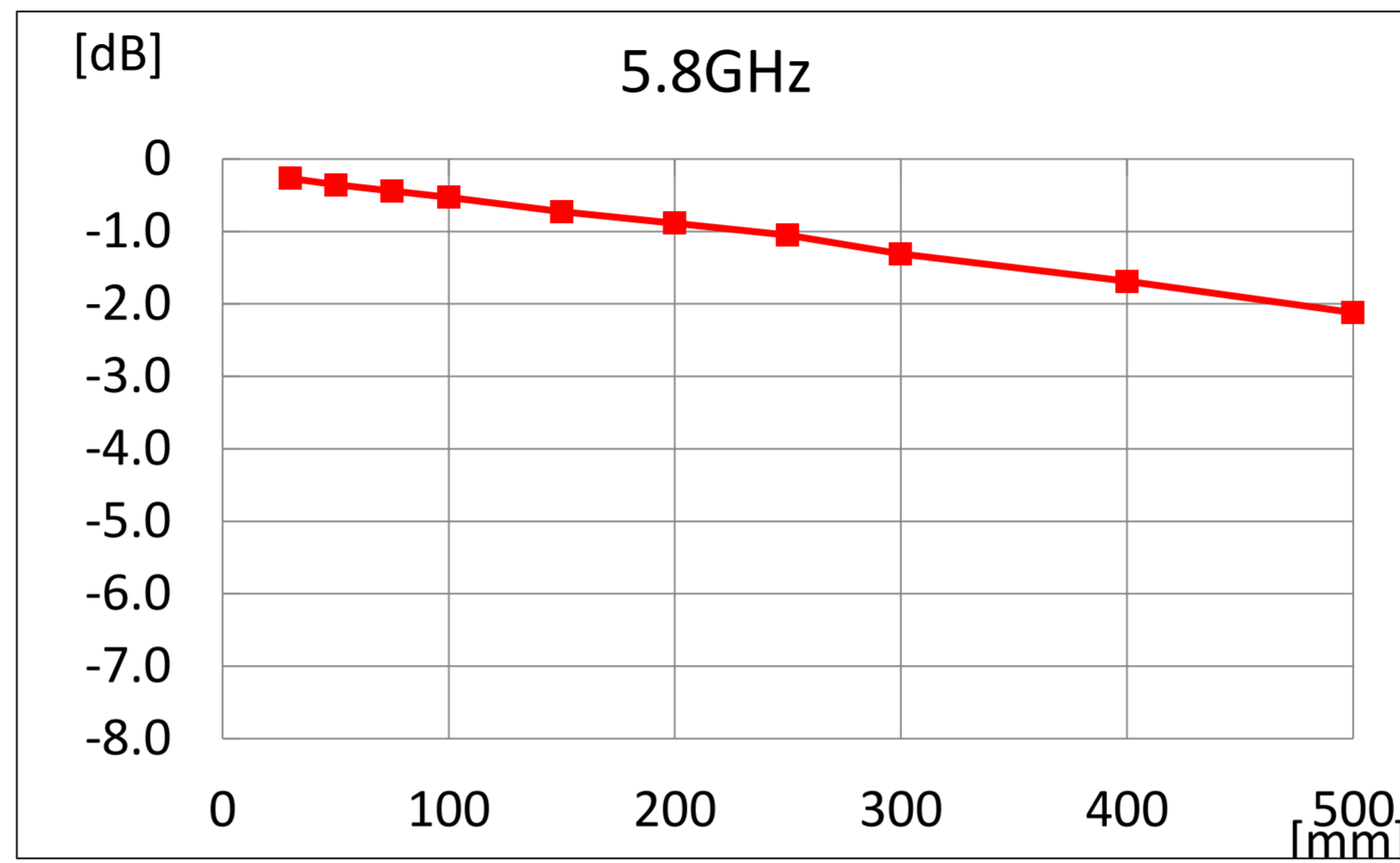
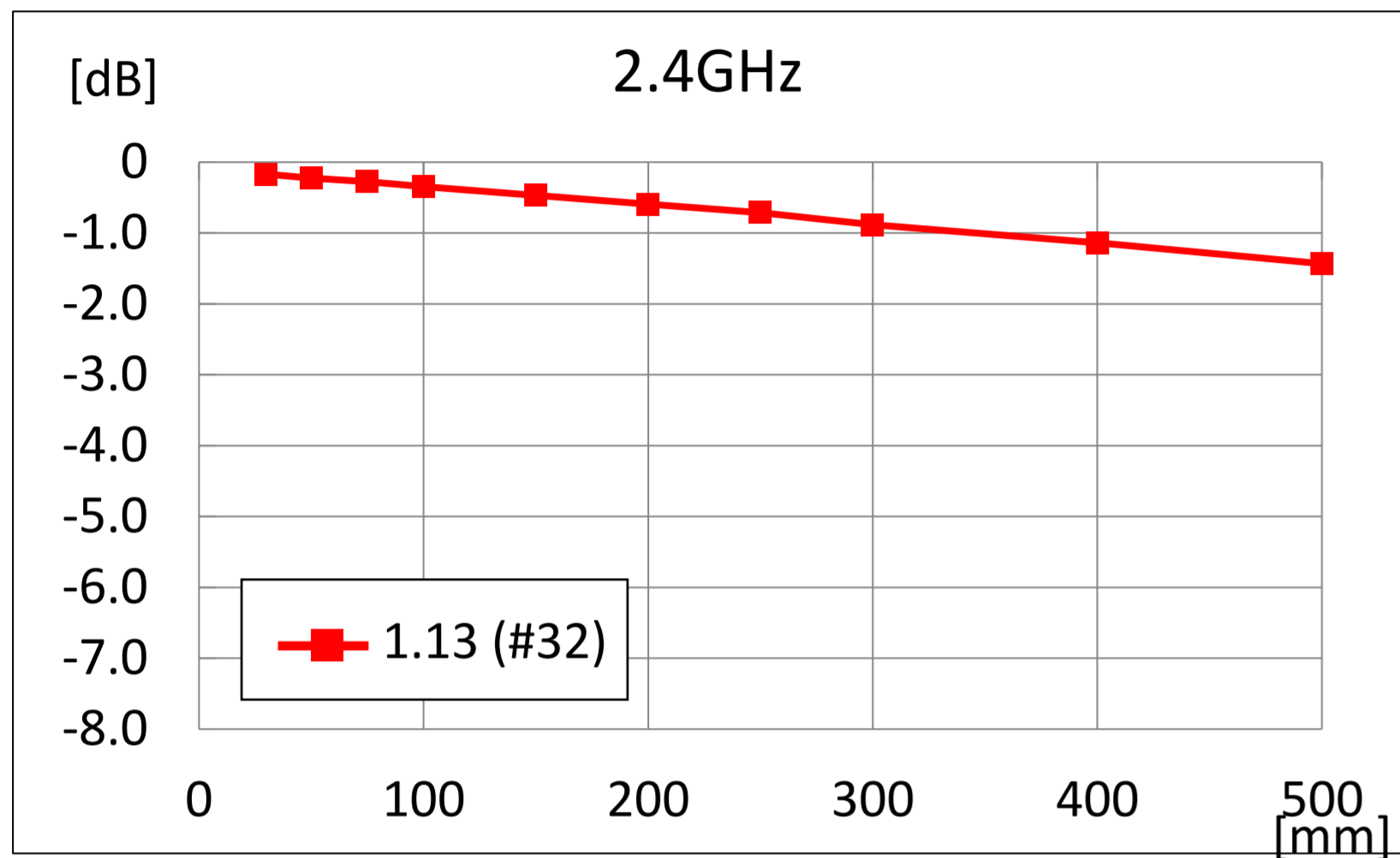
挿入損失 : MHF[®] 5L

■ Harness Length (mm) vs Insertion Loss (S21)



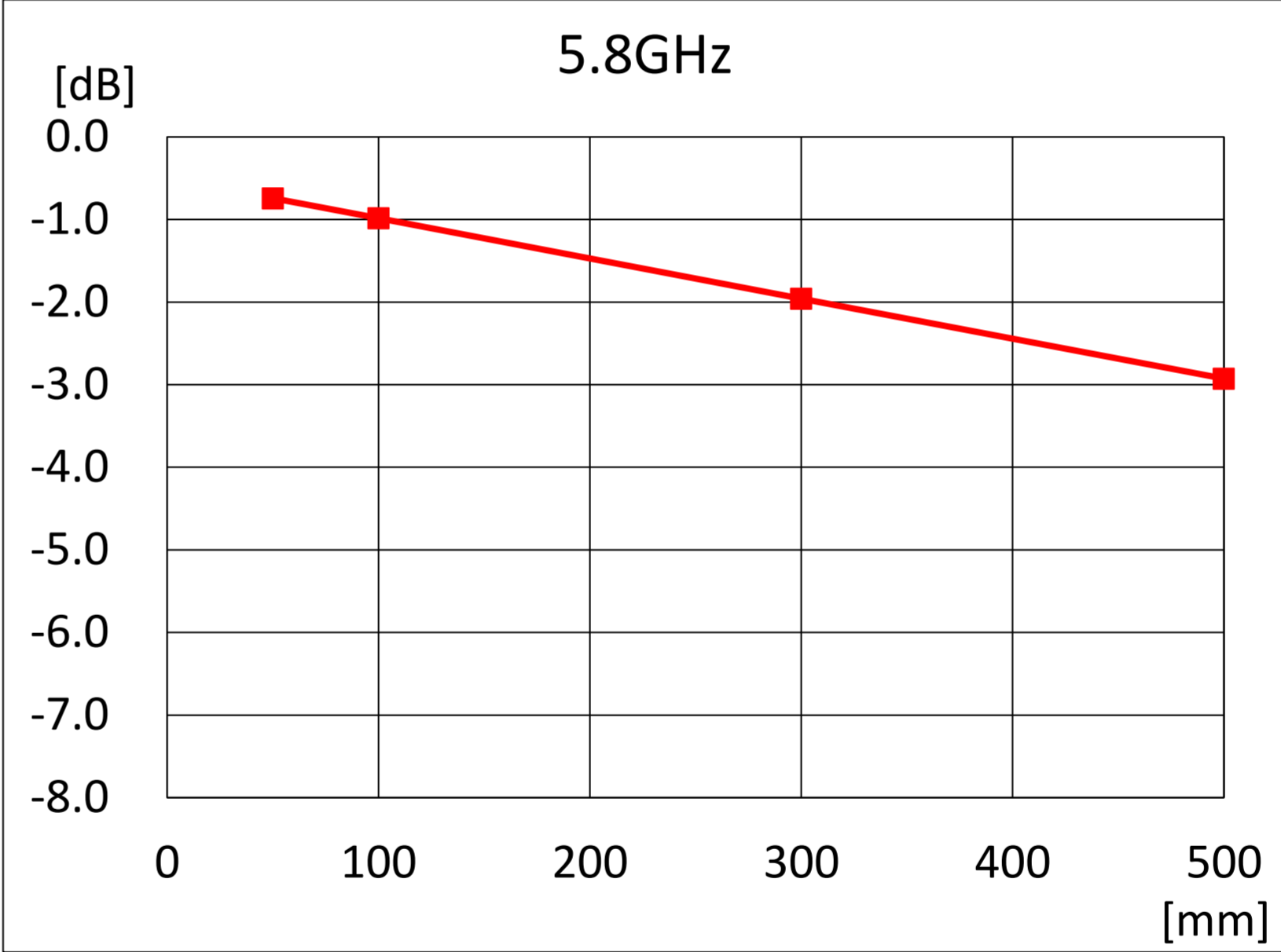
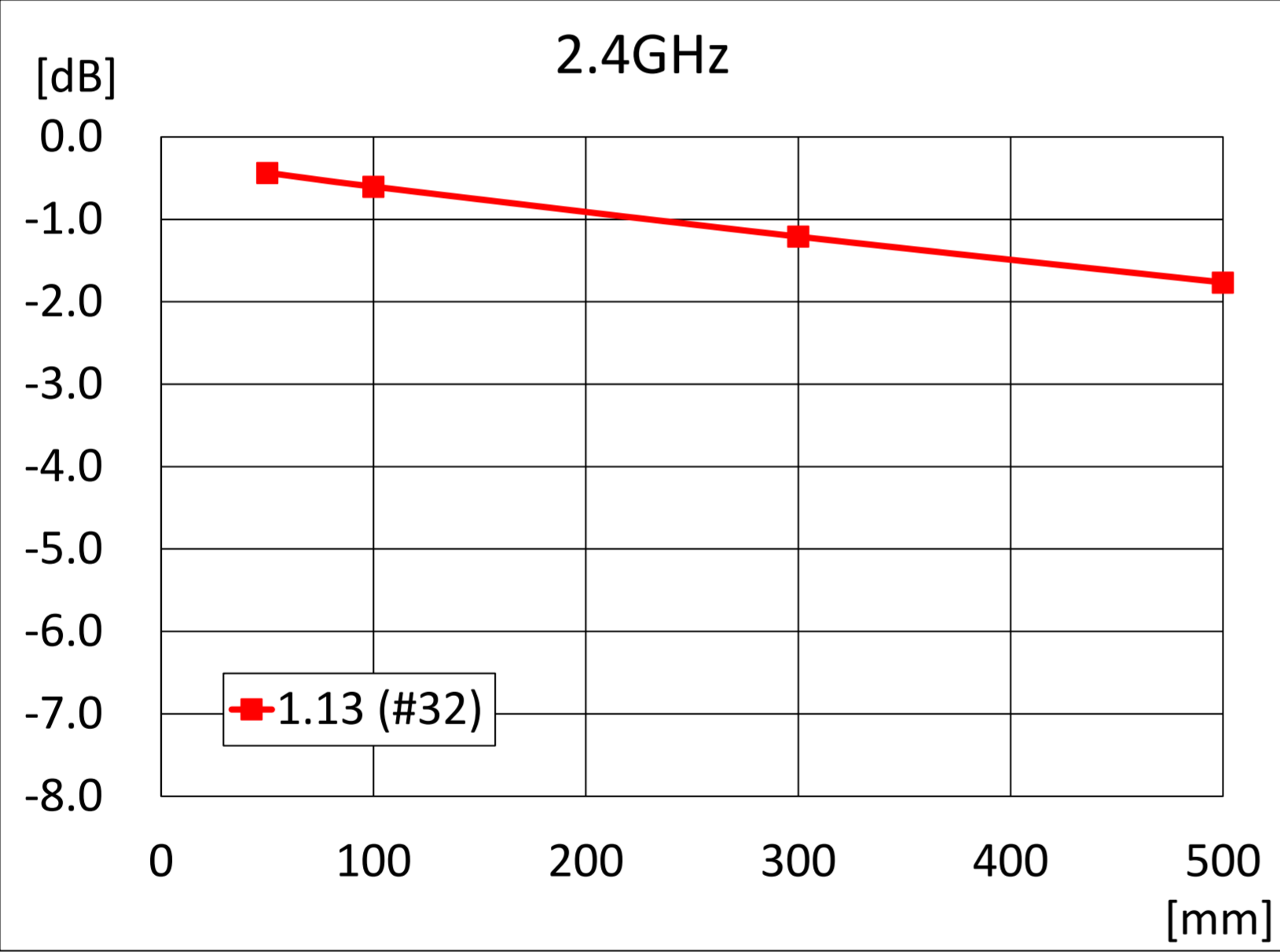
挿入損失 : MHF[®] 7S

■ Harness Length (mm) vs Insertion Loss (S21)



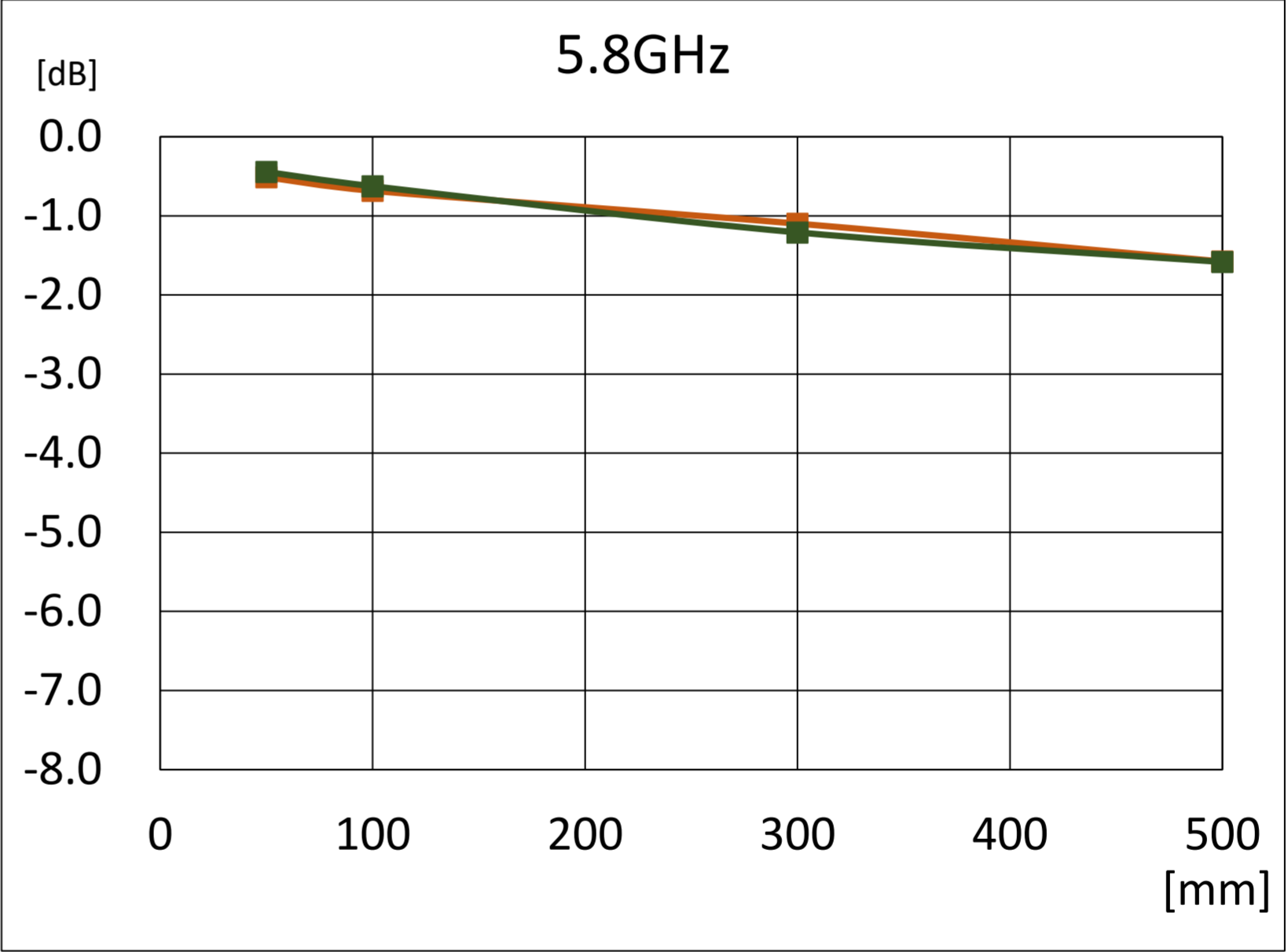
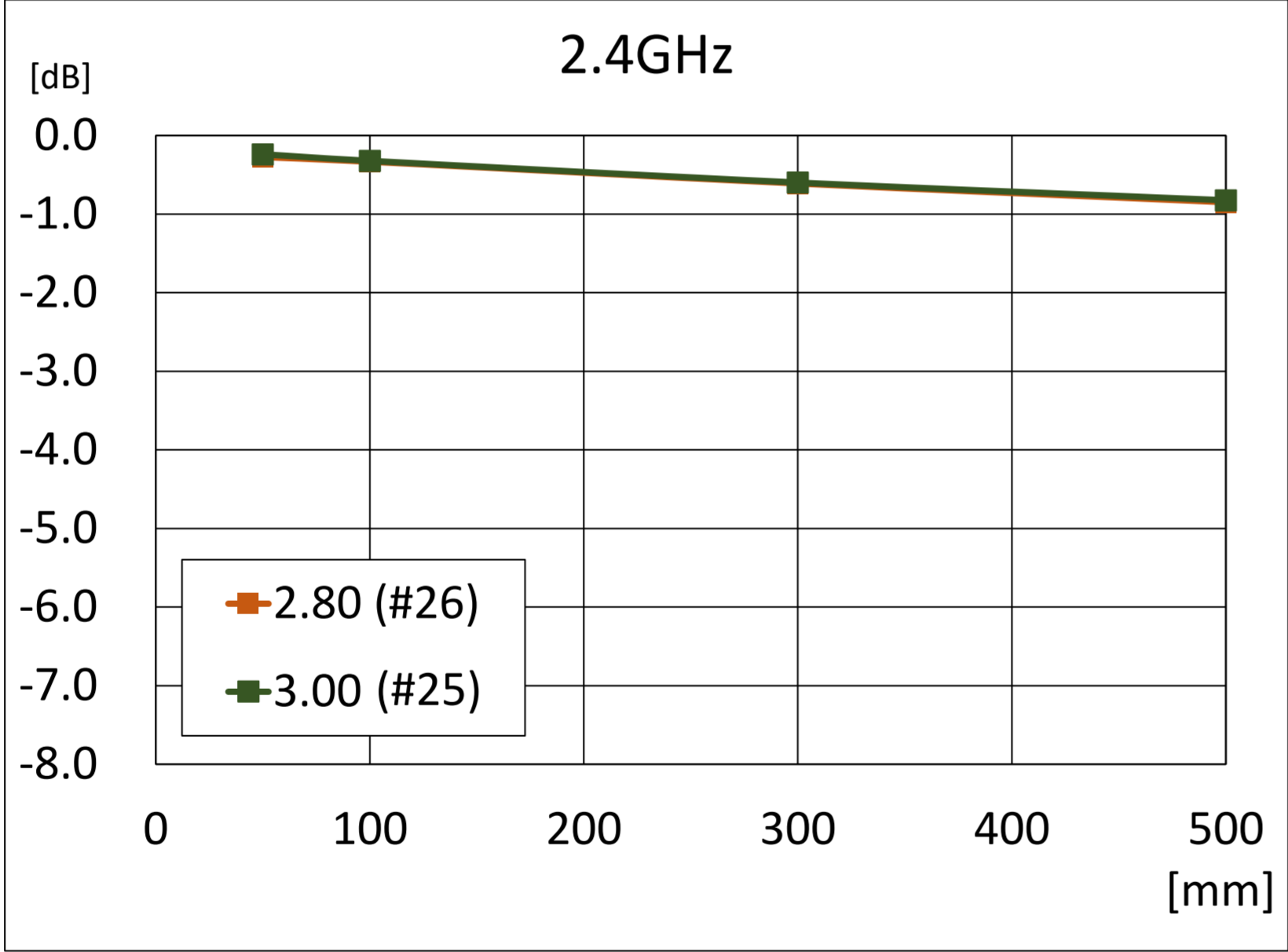
挿入損失 : MHF[®]-SW23

■ Harness Length (mm) vs Insertion Loss (S21)



挿入損失 : MHF[®]-TI

■ Harness Length (mm) vs Insertion Loss (S21)



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