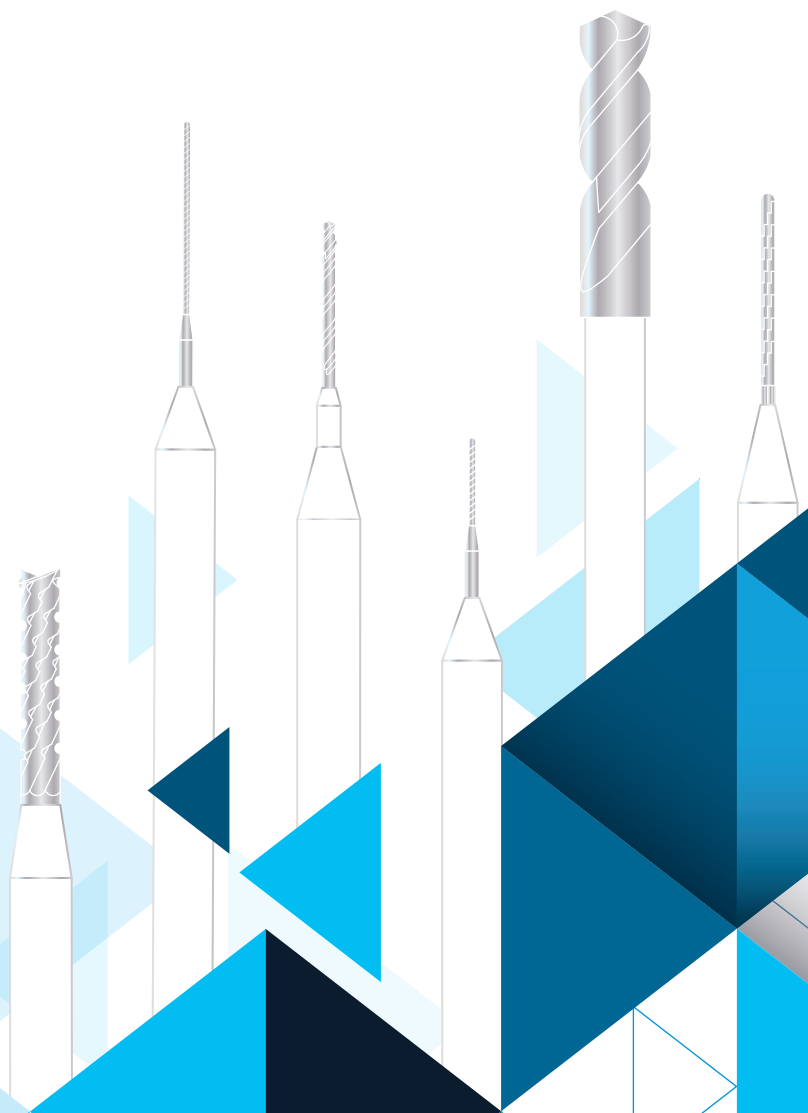




keyware

- 凱 崙 電 子 股 份 有 限 公 司 -



經營理念 Philosophy

服務
Services

誠信
Integrity

品質
Quality

創新
Innovation

公司沿革 History

- 1997** 成為台灣第一家專業生產印刷電路板專用鑽頭製造商。
Founded as the first professional PCB driller manufacturer in Taiwan.
- 2000** 獲得ISO9002、ISO14001認證通過。
Received ISO9002 & ISO14001 certification.
- 2001** 於大陸昆山成立滬崙電子有限公司。股票正式掛牌上櫃成為第一家上櫃鑽針製造公司。
Established KeyWare Electronics Co., Ltd in Kunshan, China and to be the 1st driller manufacturer listed on the Taiwan Emerging Stock Exchange.
- 2002** 台灣銷售量突破150萬支，大陸銷售量突破50萬支。
Over 1.5 million PCS selling volume in Taiwan and over 500 thousand PCS in China.
- 2003** 通過韓國Samsung、台灣金像、瀚宇、華通、南亞、欣興....等認證。
Certificated by Samsung Korea, GCE, Hannstar, Compeq, Nanya, Unimicron and etc.
- 2004** 大陸滬崙新廠落成產能計畫450萬支。
Kunshan new plant began operation with a 4.5 million PCS capacity.
- 2005** 正式量產與銷售微小鑽0.1mm。
0.1mm micro driller mass production and sale.
- 2006** 取得景碩、南亞微小鑽針認證，台灣、大陸月銷售量突破550萬支，創歷史新高。
Received micro driller certification from Kinsus and Nanya. Monthly selling volume is over 5.5 million PCS both in Taiwan and China.
- 2007** 台灣廠遷廠至龜山工業區，兩岸產能超過800萬支/月。
Taiwan plant moved to Guishan Industrial Zone and the capacity of Taiwan and China plants amounted to over 8 million PCS/month.
- 2008** ISO 9001：2008換證認證通過、ISO14001：2004換證認證通過。
Received ISO 9001: 2008 and ISO 14001: 2004 new version.
- 2009** 董監事改選，由漢友創投董事長暨創投公會常務理事，周邦基先生擔任本公司董事長。
Director-supervisor re-election. Mr. ZHOU, BANGJI, the chairman of Concord and TVCA Executive Director, was elected as the chairman of Key Ware Electronics Co., LTD.
- 2011** 中國重慶設立生產據點，產能300萬支/月，兩岸總產程超過1,100萬支/月。
Established a manufacturing plant in Chungking with a capacity of 3 million PCS/month which enhanced the total capacity of Taiwan & China to over 110 million PCS/month.
- 2015** 新增設立昆山鐳崙光電科技有限公司，正式跨入鐳射鑽孔代工之領域。
Established LaserWare Laser Technology Co., Ltd in Kunshan, to provide laser drilling services.
- 2017** 新增凱德精密工業股份有限公司，正式跨銷售高TG無鹵素覆銅板與膠片之銷售。
Established Key De Precise Industry Co., Ltd, for high TG/Halogen-Free CCL sales.
- 2018** 新增設立武漢鐳崙光電科技有限公司，正式跨入CNC(Mechanical Drilling)專業代工。
Established LaserWare Laser Technology Co., Ltd in Wuhan, to provide professional CNC (Mechanical Drilling) services.
新增設立成型製程，擴大客戶服務。
Added molding process to offer better customer service.
凱崙集團，兩岸總產能超過1,200萬支/月。
The total capacity of Key Ware group is over 12 million PCS/month.
- 2019** 新增「佳緻」鐳射專業代工，服務台灣HDI、5G鐳射製程客戶群。
Established Jia Chi to provide professional laser service for Taiwan HDI and 5G customers.

公司簡介 Company Profile

經營產品項目上下整合，基板PP銷售、鑽針、銑刀、特殊刀具、鎢鋼、相關耗材銷售。鑽孔、鏤射、成型專業代工。

- 研發與業務團隊著重未來5G相關產品與客戶共同發展伺服器、基地台、互聯網通訊、汽車等技術與產品。
- 友善生產環境通過ISO、MSDS、SGS、無有害物質、無第三國家之原物料

Integrated product line: Sales of prepreg, drillers, router bits, special cutting tools, tungsten steel Drilling, laser and molding OEM services.

- R&D and sales team cooperate with customers to develop future 5G products and technique for servers, cell sites, internet communications and automobile.
- Friendly manufacturing environment certificated by ISO, MSDS, SGS, HSF and No raw material from the 3rd world.

服務據點及項目 Location & Services



服務項目 Service



切削工具 Cutting Tool

軟性印刷電路板 (FPCB)
Flexible Printed Circuit Board
軟硬結合板 (Rigid-Flex)
Rigid-Flex

球柵陣列封裝技術
(BGA)
Ball Grid Array

工具鑽針
Functional
Drill Bit

高密度互連技術
(HDI)
High Density
Interconnect

伺服器
(SERVER)
傳統PCB
(Normal PCB)

汽車板
Automobile

切削工具

5G 伺服器 (SERVER) 專用

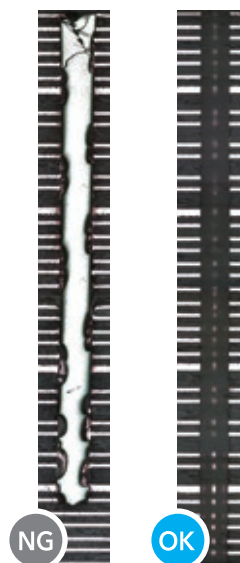
For 5G server Application

高縱橫比鍍膜鑽針 High aspect ratio with coating bit



用於超厚多層板，搭配鍍膜提升整體鑽針的排屑能力。
Drill bit with coating for super-thick multi-layered PCBs enhance the chip removing capacity.

型式 Type	外徑 Diameter	刃長 Length	縱橫比 Aspect ratio
UC	0.20	5.5	27.5
UC	0.225	5.5	24.5
UC	0.25	7.0	28.0



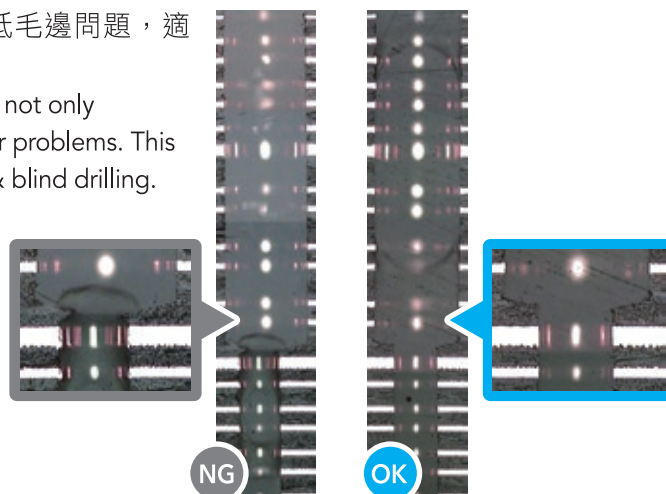
背鑽針 Backdrilling (Counterboring)



鑽尖角 150° 、 165° 之設計，提高排屑能力，降低毛邊問題，適用於背鑽、盲鑽需求。

Drill bit designed with a point angle of 150° or 165° will not only enhance the chip removing capacity but reduce the burr problems. This kind of drills have good performances on back drilling & blind drilling.

型式 Type	外徑 Diameter	刃長 Length
UC	0.30 ~ 0.70	5.0
UC	0.50 ~ 1.15	7.0



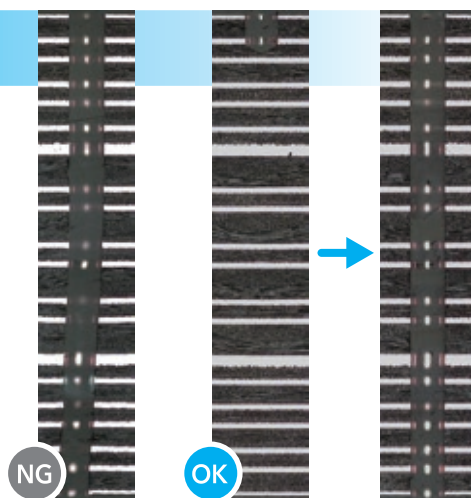
定位針 Pre drilling and positioning drilling



搭配高縱橫比鑽針所使用，為了提升高縱橫比鑽針的精度所設計。

Positioning pins are designed to enhance the accuracy of high aspect ratio drills.

型式 Type	外徑 Diameter	刃長 Length
UC	0.20	1.0



未使用定位鑽

鑽定位針後

通孔後

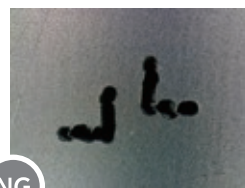
槽孔型鑽針 Slot bit



用於鑽孔機上Z軸方向的切槽加工，搭配高剛性的幾何設計，改善槽孔不良問題，提供較佳之槽孔品質。

Used for Z-axis cutting machining on drilling machines. The geometrical design along with the high rigidity improves bad slot problems and gives better slot quality.

型式 Type	外徑 Diameter	刃長 Length
SD、USD	0.40 ~ 0.55	4.7、5.5
USD	0.60 ~ 1.00	4.7
USD	0.70 ~ 1.65	6.7
SD	0.60 ~ 1.25	5.7、6.7
SD	0.70 ~ 3.00	8.7



NG

OK

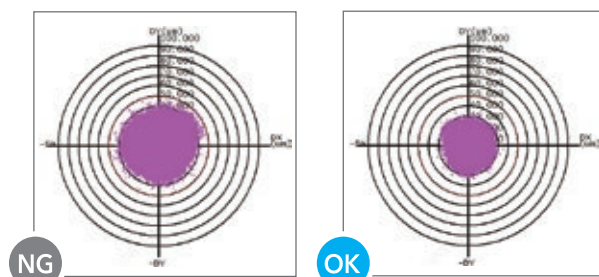
ABF專用 For ABF Application



用於增層法後的多層板，平行刀的鑽針設計再加上鍍膜膜層的輔助，可改善排屑不良且高精度的水準。

When being used on the build-up PCB, drills designed with parallel flute and coating can improve bad chip-removig and enhance the accuracy.

型式 Type	外徑 Diameter	刃長 Length
ST、UC	0.15	3.5
ST、UC	0.20	4.3



NG

OK

高密度互連技術(HDI)與汽車板(Automobile)專用

For HDI & Automobile Application



HDI：高剛性之設計，可提供較佳的孔位精度，且孔內品質亦可符合客戶端要求。

Automobile：高排屑性的設計，可提供較佳的孔內品質。

HDI: High rigidity designs not only give better hole accuracy, but satisfy the in-hole quality requirement from customers.

Automobile: The design of good chip-removing capability can give better hole quality.

型式 Type	外徑 Diameter	刃長 Length
UC	0.20	3.6、4.0
UC	0.25	4.0 ~ 5.0
UC	0.275	4.5 ~ 5.5
UC	0.30	5.0 ~ 6.2
UC	0.35	5.5 ~ 6.5

IC 載板 (BGA) 專用

For BGA Application



針對密集孔且多片疊的需求所設計，強度型的鑽針再搭配鍍膜膜層的排屑性，使精度亦可符合客戶標準。

For Dense-hole PCB and increase stack demands, intensive drill design with chip removing coating can give the accuracy which meets customer standards.

型式 Type	外徑 Diameter	刃長 Length
ST、UC	0.10	1.8、2.0
ST、UC	0.15	2.7、3.0、3.5

軟性印刷電路板 (FPCB) 與軟硬複合板 (RF) 專用

For FPCB & RF Application



針對軟性電路板所設計之產品，可改善膠凸、銅瘤及角裂等孔內品質的問題。

Products, specifically designed for FPCB, have good performances on improving hole quality, PP surface protrusion, nodules and corner cracking.

型式 Type	外徑 Diameter	刃長 Length
ST、UC	0.11	1.8、2.0
ST、UC	0.15	2.5、2.7、3.0

RCF系列 - 鑽石齒型銑刀 Series of RCF

優點：刀削鋒利、排屑性能好、精度高加工壽命長

Advantages: Sharp Good, chip-removing capability, Incredible precision Long life-time



RCB系列 - 斷屑槽型銑刀 Series of RCB

優點：抑制板邊產生毛刺、適用較高板邊要求的外形加工及槽加工

Advantages: Reducing the burr problem

Suitable for appearance and slot machining of high-edge PCB



LCF系列 - 左旋鑽石齒型銑刀 Series of LCF

優點：使用於SMT板，排屑方向往下

Advantages: Suitable for SMT PCB

Downward chip-removing direction



RCT系列 - 雙刃型銑刀 Series of RCT

優點：適用於鋁基板、鐵弗龍材質

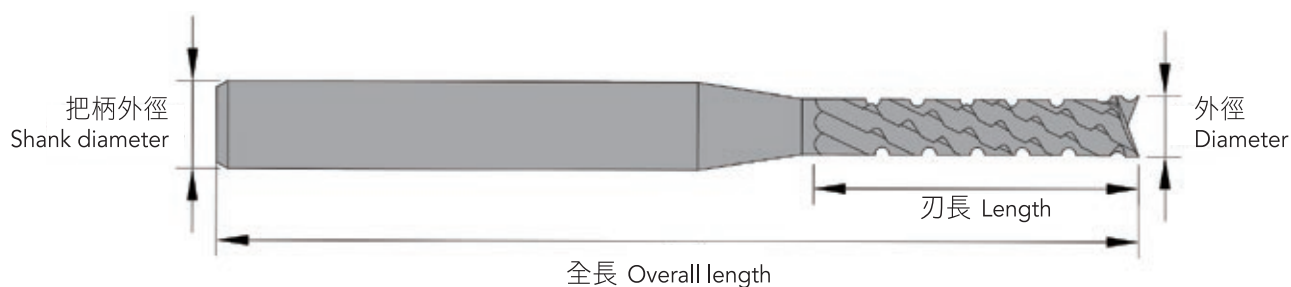
Advantages: Suitable for AL and Teflon PCB



銑刀產品尺寸範圍 Routers Dimension

類別 Type	外徑 Diameter	刃長 Length	外徑規則 Rule of diameter
★○	0.50~0.70mm	3.0~7.0 (每隔0.5mm為正常區間) Length can be made by every 0.5mm	- 外徑自0.8mm到3.1mm，每隔0.1mm為一個正常區間 Diameter: Length can be made by every 0.1mm 1.85mm和3.175 mm除外 Except for 1.85mm & 3.175mm
★◎	0.80~0.90mm	4.5~8.0 (每隔0.5mm為正常區間) Length can be made by every 0.5mm	
★◎	1.00~1.40mm	4.5~8.5 (每隔0.5mm為正常區間) Length can be made by every 0.5mm	
★◎	1.50~1.90mm	6.5~10.0 (每隔0.5mm為正常區間) Length can be made by every 0.5mm	
★◎	2.00~2.90mm	8.0~12.0 (每隔0.5mm為正常區間) Length can be made by every 0.5mm	
★◎	3.00~3.175mm	10~12.5 (每隔0.5mm為正常區間) Length can be made by every 0.5mm	

◎標準品 Standard ○非標準品，訂單生產 Non standard ★鍍膜 Coating Unit : mm



其他服務 Others

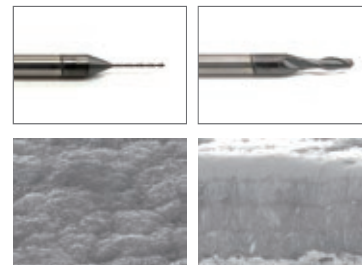
- ▶ 賣新銑刀後回收做大改小銑刀
Router Bit (Full carbide) Recycled after using Router Bit (Recycle)
- ▶ 賣大改小銑刀後回收做焊接銑刀
Router Bit (Recycle) Recycled after using Router Bit (C+C)
- ▶ 賣焊接銑刀後回收做槽刀
Router Bit (C+C) Recycled after using Slot bit

鍍膜工具 Coating Tool

類別 Type	膜層 Coating	外觀顏色 Color	膜厚 Thickness	適用大小 Range	特色 Function
鑽針 Drill bit	類鑽 ta-C		200~ 300 nm	0.075~ 0.25 mm	排屑性最佳，單價較高 best chip-removing capability, higher unit price
	類鑽 DLC		200~ 300 nm	0.10~ 0.25 mm	排屑性佳 good chip-removing capability
	氮化鋯 ZrN		200~ 300 nm	0.10~ 0.25 mm	可優化孔內品質 hole quality enhancement
	氮化鋁鉻 AlCrN		400~ 500 nm	0.20~ 0.35 mm	可耐磨耗 good wear resistance
銑刀 Router bit	氮化鋯 ZrN		1 μ m~ 4 μ m	0.80~ 3.175 mm	不易沾黏，排屑佳 good chip-removing capability
	高鋁鉻 AlTiCrN		1 μ m~ 5 μ m	0.80~ 3.175 mm	硬度高，耐磨耗 high hardness, good wear resistance

CVD鑽石鍍膜 CVD Diamond Coating

- 特性與應用：鑽石鍍膜具備7000~9000 Hv 的高硬度、低摩擦係數，且可鍍0.5~20 μ m，高熱導效率、低熱膨脹系數、良好的電絕緣性。
- 適用於High-TG、無鹵素、鋁銅基板，穩定性高，具有高壽命及尺寸穩定性。
- Features: 7000~9000HV high hardness, low coefficient of friction, Coating thickness: 0.5~20 μ m, high thermal conductivity, low coefficient of expansion, good electrical insulation.
- Application: Used on high TG and halogen-free PCB to provide high stability, long life time and stability.



其他營業項目

Other business items

雷射鑽孔加工及電測 Laser drilling OEM and electrical testing

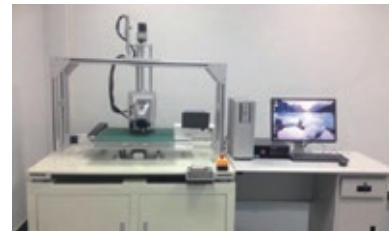
昆山鐳崙光電 KUNSHAN LASERWARE TECHNOLOGY CO.,LTD

設備數量：三菱 CO₂ 鐳射鑽孔機 10 台(二代機 *1、三代機 *2、四代機 *6、五代機 *1)、
基恩士表面形狀測定顯微鏡、CCD 量測儀

Number of equipment : Mitsubishi CO₂ laser drilling machine 10 sets (Second generation machine*1, Third generation machine*2, Four generation machine*6, Five generation machine*1), KEYENCE surface shape measuring microscope, CCD measuring instrument



三菱鐳射鑽孔機
Mitsubishi CO₂ laser drilling machines



基恩士表面形狀測定顯微鏡
KEYENCE surface shape measuring microscope

佳緻股份有限公司 JIA CHI CO.,LTD

設備數量：三菱 CO₂ 鐳射鑽孔機五台(四代機，包含一台大檯面)、
日立 CO₂ 鐳射鑽孔機二台(L type)、X-RAY 檢查機、工具顯微鏡

Number of equipment : 5sets of Mitsubishi CO₂ laser drilling machine (Four generations of machines, including one large table), 2sets of Hitachi CO₂ laser drilling machine (L type), X-RAY inspection machine, tool microscope



日立鐳射鑽孔機
Hitachi CO₂ laser drilling machine



三菱鐳射鑽孔機
Mitsubishi CO₂ laser drilling machine

電測 Electrical measurement OEM

設備數量：理德 M6 二線 + 四線電測機三台

Number of equipment : READ M6 2 line and 3sets of
4 line electric measuring machine



成型加工 Finished product router OEM

昆山鐳崙光電 KUNSHAN LASERWARE TECHNOLOGY CO.,LTD

設備數量：成型機 10 台(力嵩 & 恩德)、單軸視覺盲撈機、皮帶式 V-CUT 機、金手指斜邊機、
二次元量測儀

Number of equipment : 10 sets of molding machines (力嵩 HE SONG & 恩德 ANDERSON),single-
axis vision blind fishing machine, Belt type V-CUT machine, gold finger
beveling machine, secondary element measuring instrument



力嵩五軸成型機
HE SONG Five spindle router machine



恩德六軸成型機
Anderson six spindle router machine

機械鑽孔加工 Mechanical drilling OEM

武漢鐳崙光電 WUHAN LASERWARE LASER TECHNOLOGY CO.,LTD

設備數量：VELA 25" X 32" 大檯面六軸機 20 台(可加工盲孔深度控制板 / 背鑽板)、孔位量測儀、
內層線路檢查機、驗孔機

Number of equipment : 20 sets of VELA 25" X 32" large table top six-axis machine (processable
blind hole depth control board / back drill plate), hole position measuring
instrument, inner layer line inspection machine, hole inspection machine



VELA 大檯面六軸機
VELA 25" X 32" large table top
six-axis machine



孔位量測儀
hole position measuring instrument

台灣南亞覆銅箔基板經銷

Other business items

凱德精密工業股份有限公司

營業項目：含浸膠片銷售及裁切服務、快速 PNL 裁切交貨

Number of equipment：Prepreg sales, Cutting service and Customized size fast delivery



YOU SHI 自動鑽切機實景
Automatic diamond blade cutting machine



YOU SHI 導角機現場實景
Angle machine

高頻應用 For high frequency applications

Expansion into mmWave Spectrum

BOTH COMMERCIAL AND INDUSTRIAL ADOPTION INTO MMWAVE

0.6 GHz	2.5 GHz	3.4-3.8 GHz	4.4-4.9 GHz	ISM	28 GHz	39 GHz	64-71 GHz 71-76 GHz
Application	5G	Secure Link	Short-range	Automotive	Backhaul	5G	Next-Gen
Frequency	• <6 GHz • <28/39 GHz	• 50 GHz?	• 60 GHz (11ad)	• 60 GHz • 70 GHz	• 71-76 GHz • 81-86 GHz	• 64-71 GHz • 71-76 GHz • 100 GHz	• >100 GHz
Bandwidth	<2 GHz?		2 GHz	>2 GHz	5 GHz?		

NAN YA CCL Electrical Properties

Nan Ya Material	DK (1GHz)	Df (1GHz)	Delta L dB/inch@4G Hz (4mil core)	Delta L dB/inch@4GHz (Purley 12LB) (3mil core)	S3		Similar Materials
					Dk	Df	
NPG-150N	4.3	0.012	0.63	0.67	4.25	0.017	EM-285, TU-747HF, R1566WN
NPGN-150LKHD	3.8	0.011	0.61	0.64	4.21	0.0165	EM-355D, TU-747LK, IT-150GS
NPGN-150D	3.9	0.007	0.46	0.48	3.95	0.011	EM-355D, TU-747LK, IT-150GS
NP-175FM	4.2	0.011	0.65	0.68	4.17	0.0154	370HR, IT-180I, TU-722, TU-768
NPG-170N	4.1	0.01	0.59	0.63	4.137	0.0165	EM-370D, TU-862HF
NPG-171	3.95	0.008	0.51	0.54	4.25	0.0148	IT-170GRA1, EM-828, IS-415, TU862S
NPG-170D	3.8	0.006	0.43	0.46	3.87	0.010	EM-888, M4, FR408HR, IT-150DA, TU872SLK
NPG-186	3.65 (10GHz)	0.0036 (10GHz)	0.35	0.38	3.36	0.0057	M6, TU883, IT-968, EM891
NPG-186LD	3.21 (10GHz)	0.0028 (10GHz)	0.32	0.35	3.12	0.005	M7, TU933
NPG-196LD	3.31 (10GHz)	0.0023 (10GHz)	0.30	0.32	3.15	0.0045	M7, TU933
NPG-198LD	3.34 (10GHz)	0.0024 (10GHz)	0.30	0.32	3.14	0.0045	M7, TU933



- 凱 崙 電 子 股 份 有 限 公 司 -

凱崙電子股份有限公司

KEY WARE ELECTRONICS CO., LTD

桃園市桃園區大林里21鄰興邦路32號
No.32, Singbang Rd., 21Neighborhood Dalin Village,
Taoyuan Dist, Taoyuan City, Taiwan, R.O.C
電話：+886-3660667
傳真：+886-3668136

凱德精密工業股份有限公司

KEY DE PRECISE INDUSTRIES CO., LTD

桃園市龜山區華亞科技園區科技二路31號
No. 31, Keji 2nd Rd., Hwaya Technology Park, Guishau
Dist., Taoyuan City, Taiwan, R.O.C
電話：+886-3-3961172
傳真：+886-3-3961069

武漢鐳崙光電科技有限公司

WUHAN LASERWARE LASER TECHNOLOGY CO., LTD

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