

## SOLAR CABLE (TUV)



光伏線纜是新能源發電中的傳輸元件  
必需耐溫耐濕耐照使用壽命長  
主要使用交連聚乙烯為絕緣材料  
並使用不易氧化的鍍錫銅絲做為導體

PV cable is the transmission elements of new energy generation  
It should be temperature-resistant, weather-resistant, flame-resistant, long lifetime on usage  
Mainly using XLPE as insulation material and not easily oxidized tin-plated copper as conductor.

## UL HOOK-UP WIRE



我們能提供 UL-1007/UL-1015 電子線,  
應用於電子設備內部/汽車工業上

We have UL certification!  
We produce various UL-1007/UL-1015 electronic wire

ITEM NO.型號	3072000001	3072000002	3072000003	3072000004	3072000005
JACKET COLOR 顏色	BLCAK	BLCAK	BLCAK	BLCAK	BLCAK
CONDUCTOR.導體	30/0.254 TC	50/0.254 TC	56/0.30 TC	84/0.3 TC	12/0.39TC*7C
JACKET OD.外徑	4.7	5.3	6.0	7.0	8.2
MAIN CONDUCTOR AWG 主要導體直徑	1.5mm <sup>2</sup>	2.5mm <sup>2</sup>	4.0mm <sup>2</sup>	6.0mm <sup>2</sup>	10 mm <sup>2</sup>
INSULATION 絕緣	XLPE	XLPE	XLPE	XLPE	XLPE
JACKET 護套	XLPE	XLPE	XLPE	XLPE	XLPE
100Mweight/100M 重量(kg)	3.54	4.94	6.83	9.6	14.44
ELECTRICAL PERFORMANCE 電氣性能					
Cond.D.C.R. ohm/1Km 導體電阻/1km	13.7	8.21	5.09	3.39	1.95
AC Voltage Breakdown 交流 絕緣承受電壓	AC 600/1000V	AC 600/1000V	AC 600/1000V	AC 600/1000V	AC 600/1000V
DC Voltage Breakdown 直流 絕緣承受電壓	DC 1800V	DC 1800V	DC 1800V	DC 1800V	DC 1800V
MECHANICAL PERFORMANCE 機械性能					
Flex Life load 500g +/-30° 搖晃壽命負載 500g 角度 +/-30°	Only for installation 只供固定安裝				
Tensile Strength (26°C, 65%RH)拉伸斷裂力量	Only for installation 只供固定安裝				
Applicable Temperature 建議工作溫度	-40°C~ +90°C (-40°F~ +193°F)				

## 3071607310

307  
SUN RISE CABLE ITEM  
日昇電子品號

16  
UL安規電子線子料目  
UL SERIES SUBITEM

07 UL-1007 STYLE  
表UL-1007  
15 UL-1015 STYLE  
表UL-1015

AWG表導體大小  
0:AWG10 5:AWG20  
1:AWG12 6:AWG22  
2:AWG14 7:AWG24  
3:AWG16 8:AWG26  
4:AWG18 9:AWG28  
A:AWG30

JACKET COLOR

表外皮顏色  
0:黑  
1:棕  
2:紅  
3:橙  
4:黃  
5:綠  
6:藍  
7:紫  
8:灰  
9:白  
A:綠/黃

CONDUCTOR TYPE

表導體材質  
1:AS(BC) 裸銅絞線  
2:TS (TC) 鍍錫銅絞線

## INFO 專業知識

## 問：星絞線有甚麼特點嗎？

我了解了一下星絞線，其中內部結構能相互抵消的干擾像一個拾音器？

我正在考慮在通用像這樣的10米麥克風線提供家庭使用

SOUND ON SOUND技術編輯 Hugh Robjohns寄來：

對於外行人的人，有四個導線的星絞線，是因為QUAD這個名字的一部分-外部加上屏蔽層。屏蔽層有助於防止電磁干擾信號達到核心。這種傳統的電纜一樣，這四個導體非常緊密地相互扭曲並旋轉成一個相對較短的角度，稱為短絞線。

這種設計讓磁場同軸結構大大改善，比起一般的雙導體麥克風線，提高了高達20dB抗電磁干擾能力！

如圖所示，四導體都被排成一個互相對稱的結構，相對稱的結構是被並聯，形成平衡的一對線，但是星絞線的電纜，導體間電容將大大高於較傳統2芯平衡式電纜。這就是較差的一部分，因為它可能會導致較多的高頻損失當在很長的距離傳輸時-雖然它確實是一個問題，但在超過10m，甚至50m才會發生。

較成功的一部份則是星絞線非常有效的隔離了外部干擾源造成的電磁感應-這種干擾可能來自一個麥克風電纜鋪設的路徑上有強輻射源，這種干擾大多是來自訊光線(磁場)！

為了了解它是如何工作，現在我們想像一下平衡式麥克風電纜在「長度很短」狀態下，旁邊有一個對稱的干擾源，這干擾會平均傳入兩個導體，若透過平衡式接到音響設備，這樣就能夠排除干擾；但這前提呢，必須在兩個相等的每對導體核心上但是會存在一個狀況是：離干擾源近的會拾到較多能量，遠的會少一點，因為導體在線路裡是持續的對絞旋轉前進的這距離其實相當的長，造成了兩個導體拾到的干擾強度不同，因為在這過程中，絕對會讓一個導體收到比另一導體較強的干擾，這結果會導致某些干擾是排除不掉的，因為在微觀上去觀察，那是一個不等的非平衡狀態！

星絞線能克服這個問題，因為該結構是四個導體，兩兩相對，我們把剛例子的麥克風線換成星絞線，我們可以想像，其中一對是垂直的，所以會受到同等數量的干擾，因為它們與干擾源是完全相等距離的，然而，其他兩個導體是水平的，這意味著一個導體是略接近干擾源，而另一條路路遠，因為存在距離的差異，所以水平導體上將會收到強度不同的干擾電場，但是由於是星絞線，所以在相反的方向，干擾電場將較弱些，而這些干擾在水平導體上的加總將與垂直的將會幾乎相等，而這就有助於音響設備的共模互斥處理。

這就像變魔術一樣！的干擾平均的被引入到導體中，最後面共模互斥做了良好的基礎，而電纜在很短的距離內旋轉(短絞線)更有助於平衡干擾，這星絞線的結構在1930年代就被發明應用在電話電纜上，並被使用電視業界在1960-70年代時，甚至今日，它被廣泛應用，特別在那種是麥克風線不得不布放強干擾源旁邊的時候。

至於我是否會用優先星絞線呢？我不會，因為你的距離不是很短，並且在國內射頻管制是比較嚴格的，干擾的問題是較小的，我寧可從正規有信譽的供應商去取得一種標準的2芯平衡式電纜，我特別喜歡雙屏蔽電纜 (Reussen screen)，因為它廣泛用於廣播。

Q. What's special about star-quad cable?

I've just read up about star-quad cable, which has internal cores that cancel each other's interference-like a humbucker? Would you use star-quad cable in preference to ordinary balanced cable? I'm thinking in terms of microphone cables of 10 metres in length, for use at home.

SOS Technical Editor Hugh Robjohns replies:

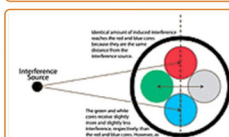
For the uninitiated, there are four cores in star-quad cable - the clue is in the 'quad'-part of the name - plus an overall screen. The screen helps to prevent electrostatic interference from reaching the signal cores, just as in a conventional cable. The four cores are very tightly twisted with each other and rotate over a relatively short length, known as a 'short lay length'. This arrangement results in a magnetically coaxial structure and provides greatly improved rejection of electromagnetic interference compared to standard two-core mic cables - perhaps by as much as 20dB.

The red and blue cores are wired in parallel to form one half of the balanced pair, and the green and white cores form the other half. Some standard cables use two white wires for one pair and two blue wires for the other.



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圖說：紅色和藍色的導體並聯，形成一個平衡的一半；綠色和白色的導體形成另一半。有些星絞線是兩白+兩藍導體去構成。



How star-quad cable rejects electromagnetic interference  
星絞線如何抵制外部電磁干擾效果。

As the diagram shows, the four cores are arranged in a cross formation, and the opposite cores are wired in parallel to form a single balanced pair. Obviously, with four wires in the cable, the core-core and core-screen capacitance will be much higher than in a more conventional two-core cable, and that's the down side because it can result in a greater HF loss in very long cable runs - although it really won't be a problem over 10 metres, or even 50.

The up side is better rejection of very close-source electromagnetically induced interference - the kind of interference that might come from laying a mic cable alongside something that radiates strong and nasty interference (some kinds of mains dimmer cables, for instance).

To understand how it works, consider a standard two-core mic cable lying for a short length alongside a nasty interference source. Some of that interference will leak into both cores, and to be rejected by the balanced input of whatever the cable is connected to, the induced interference must be equal in amplitude on both cores.

However, there will be slightly more energy transferred into the core that's closer to the interference source, and less into the further core. Since the two cores usually twist around each other in a fairly long lay length down the mic cable, there's a very good chance that one core will pick up slightly more interference from that close source than the other core, and the result will be some audible interference because the imbalance means it won't all get rejected.

Star-quad overcomes this problem because of the way the four cores are wired in opposite pairs. Replacing the standard mic cable in the example above with Star-quad, we can imagine that one pair of wires may be directly above one another vertically, and will therefore pick up equal amounts of interference because they are exactly the same distance from the nasty cable lying alongside. However, the other pair will be horizontal, and that means that one core will be slightly closer to the interfering cable, while the other will be slightly further away. The differences in distance of these horizontal cores relative to the vertical cores will be equal but in opposite directions, and the average interference in the two horizontal cores will therefore hopefully be exactly the same as that of the two vertical cores. Hey presto!

Much better balance of interference and therefore better rejection. The very short lay length of the core twisting also helps to make sure that any interference is induced equally into the two paired sets of wires.

The star-quad configuration was invented for use in telephone cables back in the 30's, and was adopted in the TV world in the 60's and 70's. It is widely used today, particularly where there is a likelihood of having to lay mic cables alongside strong sources of interference.

As to whether I would use star-quad in preference to ordinary balanced cable, I wouldn't, particularly. With that short a cable run, and in a domestic situation, interference isn't likely to be an issue at all. There's no reason not to buy star-quad if you can get a good deal, but I wouldn't seek it out specially, as you're very unlikely to gain any significant benefit. I'd look for a decent two-core cable from a reputable supplier. I particularly like double-screened cables ('Reussen' screen), which are also widely used in broadcasting.

## 編輯點評：

1. 本文證實星絞對於抗干擾是有用的，且有物理依據的

2. 夠短的線距是抗干擾結構必要因素

3. 電磁干擾與無線電

射頻管理在北美是相當嚴格的，因此射頻干擾問題較低！

線材技術中英文對照			
Conductor	導體		
絕大多數的線材導體均為導電良好的銅材/銀線/或多種金屬添加之導體。銀或鍍銀材質聲音較亮；鍍鎳則能讓銅線較不容易氧化。在 SUNRISE 除特別聲明以外全數採用 99.97% 以上的 OFC 無氧銅!			
OFC	採用無氧銅做為導體	TC	鍍鎳銅線
HI-OFC	採用高純度無氧銅做為導體,其純度將另外說明	SPC	鍍銀銅線,其高頻傳輸效果較佳,高音明亮
Insulation	絕緣		
PVC	聚氯乙烯 Polyvinylchloride · 被國際綠色和平組織稱為「毒害膠」· 其絕緣性能最差,燃燒會產生毒氣		
PE	聚乙烯 polyethylene,其絕緣程度較 PVC 為佳		
XLPE	交連聚乙烯 其絕緣又高於 PE 之效果,通常用於高頻率之視/射頻線材		
FPE	發泡聚乙烯 其絕緣又高於 PE 之效果,通常用於高頻率之視/射頻線材		
MYLAR	麥拉薄膜 用以取代中被進行絕緣		
Craft	製作工藝		
TWISTED	對絞的,用以強化線對的強度,不易鬆散,並能平均受到干擾,以變差動放大排除干擾		
STAR-QUAD	星絞,單一線纜中正負信號再分為兩芯對稱傳輸,讓抗干擾更好		
COAXIAL	同軸,主要用於視頻與射頻使用		
PAIR	線對,線纜做為成對使用,通常用以形容多組線對做在一起的通信纜線或音頻多芯纜		
由於音視頻設備其工作電壓極低,因此線材屏蔽上顯得格外重要;茲就屏蔽方式做一介紹			
● 銅絲纏繞:此為利用一般銅絲纏繞於內被之上,遇到曲曲時,容易產生屏蔽不良的狀況;大部分被應用於短距離之話筒線使用,如我司之 3070100020			
● 銅絲編織:此方式將銅絲以多條成一股方式彼此編織成網,其優點為遇到曲曲時,可以經由網子特性而達到舒緩的效果;其遮罩特性遠高於纏繞,被應用於專業舞臺演出與需要移動之場所,			
● 鋁箔隔離:利用鋁箔特性,將線材週邊加上鋁箔作為屏蔽,並搭配一般地線以便接地;其屏蔽效果佳,但因鋁箔較硬,過度彎曲容易破損,因此此類線材多應用於工程安裝或舞臺多芯線上			
● 導電 PVC/PE:此為利用軟性材質導電 PVC/PE 鋪設於線材外部,具有全面覆蓋與不易破損之特點,但需搭配纏繞或編織使用;此一手法只在高級線材上操作。			
● 複合隔離(雙隔離):雙隔離為彌補上述多種屏蔽缺點所製造出來之手法最常見為鋁箔+編織,主要為提供需要極高屏蔽之線材,我司之 3070100039 即是;此外 VGA 訊號傳輸之 UL-2919 線材亦是採用此類技術,如我司之 3070100015			
SHIELD	外圍屏蔽		
DUAL SHIELD	雙層或多層外圍屏蔽	AL (ALUMINUM-FOIL)	採用鋁箔方式製作外圍屏蔽
SP (SPIRAL)	採用纏繞方式製作外圍屏蔽	CPE (CONDUCTIVE PE)	採用導電 PE 製作外圍屏蔽
BD (BRAID)	採用編織方式製作外圍屏蔽		

**ATTENTION PLEASE!!**

SUNRISE 型號中所標之線纜截面積均為導體截面積,換算為美標 AWG 時會考慮足該標準電阻,因此同一 AWG 的截面積可能不同! In SUNRISE catalogue, the cross sectional area we mentioned is for conductor. As converting to US standard, AWG, the numbers should reach the bottom line of standard.

Thus, the cross sectional area of conductor would different as in the same AWG.

音箱線建議線徑與距離表

距離 8ohm 狀況下	距離 4ohm 狀況下	線徑 mm <sup>2</sup>	AWG
2.5 M	---	0.3	22
5 M	---	0.5	22
7.5 M	2.5 M	0.8	18
10 M	5 M	1.31	16
15 M	7.5 M	2.1	14
20 M	10 M	3.3	12
50 M	15 M	5.3	10

AWG DATA SHEET

AWG	外徑/O.D.		截面積 mm <sup>2</sup>	電阻值 ohm/KM	正常電流 NORMAL CURRENT(A)	最大電流 MAX CURRENT(A)
	公制 mm	英制 inch				
8	3.26	0.129	8.37	2.11	33	37.7
9	2.91	0.114	6.63	2.67	26.02	29.8
10	2.59	0.102	5.26	3.36	20.8	23.7
11	2.3	0.091	4.17	4.24	16.5	18.8
12	2.05	0.081	3.332	5.31	13.1	14.9
13	1.82	0.072	2.627	6.69	10.4	11.8
14	1.63	0.064	2.075	8.45	8.2	9.4
15	1.45	0.057	1.646	10.6	6.5	7.4
16	1.29	0.051	1.318	13.5	5.2	5.9
17	1.15	0.045	1.026	16.3	4.1	4.7
18	1.02	0.04	0.8107	21.4	3.2	3.7
19	0.912	0.036	0.5667	26.9	2.6	2.9
20	0.813	0.032	0.5189	33.9	2	2.3
21	0.724	0.029	0.4116	42.7	1.6	1.9
22	0.643	0.025	0.3247	54.3	1.28	1.46
23	0.574	0.023	0.2588	68.5	1.02	1.16
24	0.511	0.02	0.2047	89.4	0.81	0.92
25	0.44	0.018	0.1624	79.6	0.64	0.73
26	0.404	0.016	0.1281	143	0.51	0.56
27	0.361	0.014	0.1021	128	0.4	0.46
28	0.32	0.013	0.0804	227	0.32	0.36
29	0.287	0.011	0.0647	289	0.26	0.29
30	0.254	0.01	0.0507	361	0.2	0.23
31	0.226	0.009	0.0401	321	0.16	0.18
32	0.203	0.008	0.0316	583	0.13	0.15

### SUNRISE的創意設計包裝



EASY PULL BOX  
design for  
6mm/100M  
4mm/200M

側面標示清晰  
便於運送  
與打包



使用後成為單個紙箱回收

4. 剪開半月孔  
5. 蓋上外蓋, 將扎帶  
穿入蓋子, 拉緊!



易於打開與關上,  
免用膠帶

1. 打開內蓋, 將線上的線剪開, 拉出內圈,  
2. 在長內蓋上穿過所附的扎帶

3. 蓋上短內蓋

可引導  
線纜抽出



▲ WOODEN SPOOL

PP & PAPER SPOOL ▼



### O.D. V.S. SPOOL MAX-LOAD METER 載線量

TYPE	SPOOL ITEM	SPOOL SIZE			MAX LOAD METER/O.D.					
		D1	D2	H	1000M	305M	100M	80M	30M	15M
PAPER	2566100002	150	60	100			3.3			9
PAPER	2566100003	160	60	120				4.3		
PAPER	2566100004	180	60	110			4.3		8	
PAPER	2566100006	180	60	160				6		
PAPER	2566100008	220	60	135			6 or 6.5			
PP	2566200003	355	175	185		6				
PP	2566200012	230	80	125			6			
PP	2566200013	270	80	125			8			
WOODEN	2566300010	280	150	180			7 or 8			
WOODEN	2566300014	340	150	200			10			
WOODEN	2566300006	340	150	220		7	11			
WOODEN	2566300007	300	150	200			9			
WOODEN	2566300012	300	150	230			9.5			
WOODEN	2566300008	460	180	300		6				
WOODEN	2566300011	400	180	250			13			
WOODEN	2566300002	400	150	330			15		22	
WOODEN	2566300009	500	180	300			18		25	
WOODEN	2566300016	530	180	300			20			
WOODEN	2566300005	530	180	300			22			

### MULTI-CABLE PACKAGE 多蕊線包裝

NO	TYPE	SPOOL ITEM	SPOOL SIZE			MAX LOAD METER/O.D.	
			D1	D2	H	CH	O.D
10	WOODEN	2566300014	340	150	200	4	10
15	WOODEN	2566300011	400	180	250	8	13
16	WOODEN	2566300002	400	150	330	12	15
17	WOODEN	2566300009	500	180	300	16	18
18	WOODEN	2566300016	530	180	300	20	20
19	WOODEN	2566300005	530	180	300	24	22
20	WOODEN	256630017	650	300	350	32	26