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Fully Insulated Wire

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Agenda

- High Frequency Transformer Trend
- KFIW introduction
  - Product
  - Comparison
  - Success story
- Certificate
- Conclusion

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Power supply downsized

Innergie PoweGear 60c
vs. traditional adapter

45~99W charger downsized

Source：
https://forum.gamer.com.tw/Co.php?bsn=60559&sn=112836
https://ahui3c.com/44483/usb-c-charge

Transformer must downsized

Enamel wire

TIWW apply

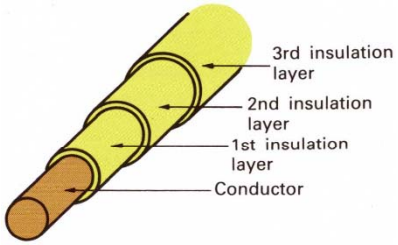
What’ s next

Reasonable cost, better performance material will help upgrade this market again.

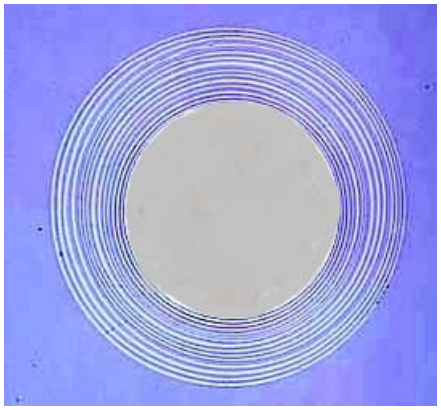
New Product for this Market

Enamel wire

TIWW



Fully Insulate wire



Japan Yoshikura Techno Fully insulated wire will help customer

- Downsize design
- Improve the power density
- Reduce the total cost

Comparison of 3 products

Enamel Wire

- 1960s tech.
- A few layer varnish coating
- Withstand voltage- low
- Lower cost

TIWW

- 1990s tech.
- PET or PA for insulate layer
- Withstand voltage- High
- Higher cost

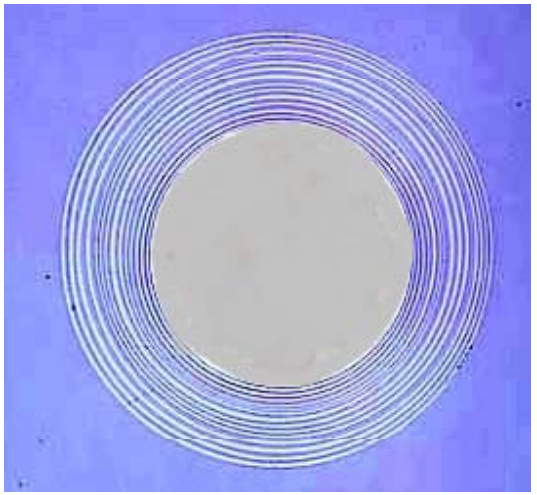
KFIW

- 2010s tech.
- High layer varnish coating
- Withstand voltage- High
- No pin hole
- Smaller OD.

What’ s Fully Insulated wire?

Production process

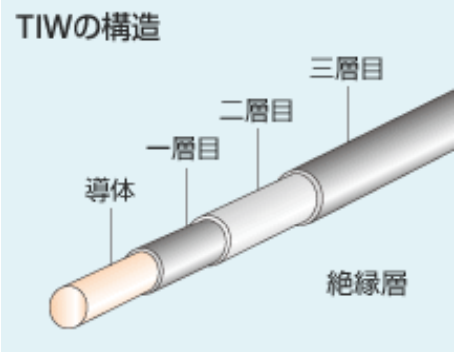
- Japan Yoshikura & Germen equipment suppler co-develop
- Over 30 layer coating
- Reinforced class insulated type
- No pin hole

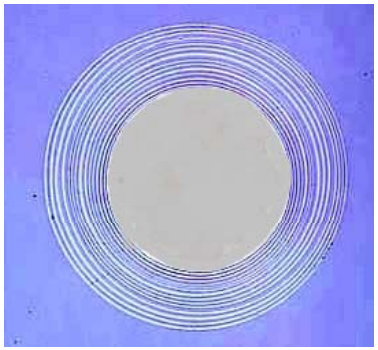


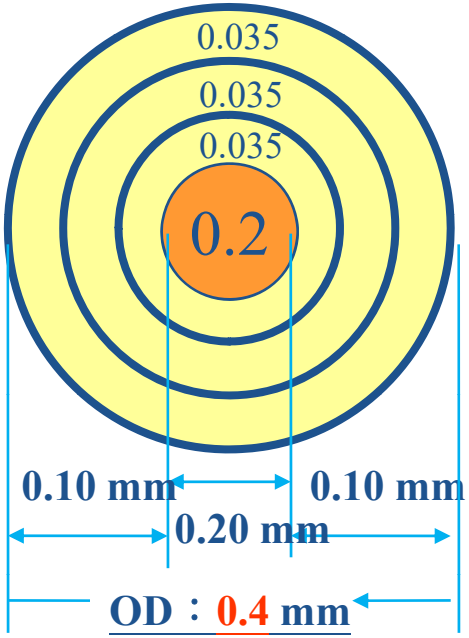
KFIW advantage-1

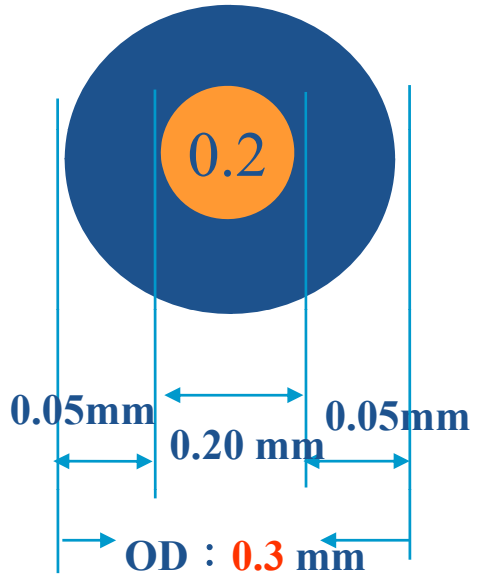
1. Smaller OD. for flexible design

Insulate layer thickness around 0.05mm









Insulated layer around 30% decrease

KFIW advantage-2

2. Mechanical strength better

- Suitable for automatic winding equipment
- High withstand voltage

3. Low temp. soldering

- Better soldering condition with low energy consumer

4. High temp. withstand.

- VDE 180℃ temp. verify
- UL60950 130℃/155℃ verify

Comparison of KFIW and TIW

	KFIW	TIWW
Insulate layer thickness	Insulate layer thickness 0.05-0.07mm(one side)	Insulate layer thickness 0.1mm (one side)
Breakdown Voltage	23 kv	12 kv
Solder temp.	410-430℃/ 1~4S	440-480℃ / 3~8S
soldering guns can damage	2mm	5-8mm
Insulate layer strength	Multiple layer coating	PET/PA

FIW- Supplier analyze

	certification	Dia. (mm)	technical	Focus Market
ElektOOO	UL Objt2 VDE	0.1-0.5	1st supplier in the market	Small size Automotive application
Yoshikura	1st apply into EIS system UL Objt2 VDE	0.08-1.45	Specialize production equipment	Transformer Automotive application
SunOOO	UL Objt2	0.09-0.4		Enamel wire
DenOO	UL Objt2 VDE	0.09-0.4	Enamel process	Enamel wire
TaiOO, DOO	UL Objt2	0.1-0.5	Enamel process	Enamel wire

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UL OBJT2

Single- and Multi-layer Insulated Winding Wire - Component

See General Information for Single- and Multi-layer Insulated Winding Wire - Component

YOSHIKURA TECHNO CO LTD E353894
3RD FL TTD BLDG 1-2-18 MINATOKU
TOKYO, 108-0073 JAPAN

Cat. No.	Insulation Type	TIW Conductor Size Range	Temp Class °C	Rated Volts UL 60950-1 V peak	Rated Volts UL 60601-1 V rms
KDW-B	Supplementary	38 - 29 AWG	130(B)	1000	-
KSW-B*	Basic	32 - 18 AWG	155(F)	1000	-
KSW-F*	Basic	32 - 18 AWG	155(F)	1000	-
KTW-B-SB-xx (@)	Reinforced	32 - 18 AWG	130(B)	1000	-
KTW-B-xx(@),KTW-BLZ-xx (@)	Reinforced	32 - 18 AWG	130(B)	1000	-
KTW-E*-xx (@)	Reinforced	32 - 18 AWG	120(E)	1000	-
KTW-E-xx (@)	Reinforced	32 - 18 AWG	120(E)	1000	-
KTW-F*-xx (@), KTW-F*-SB-xx (@)	Reinforced	32 - 18 AWG	155(F)	1000	-
KTW-F-W-xx (@), KTW-F-W-SB-xx (@)	Reinforced	39 - 18 AWG	155(F)	1000	600
KTW-F-xx(@),KTW-FLZ-xx (@), KTW-F-SB-xx (@)	Reinforced	39 - 18 AWG	155(F)	1410	600

Cat. No.	Insulation Type	FIW Conductor Size Range	Temp Class °C	Test Voltage V
KFIW-B	Reinforced	39 - 15 AWG	130(B)	3000
KFIW-F	Reinforced	39 - 15 AWG	155(F)	3000

Electrical Insulation Systems (EIS)

Electrical Insulation System Components E313942

HOI LUEN ELECTRICAL MFR CO LTD

Unit 4, G Fl, Transport City Bldg, 1-7 Shing Wan Rd, Tai Wai, Shatin HK

System Component	System Designation	System Class
FIW(x)-B, FIW(x)-F	HL 130-1	130(B)

Report Date: 2019-02-08

ons: Table III ▼

An Authorization Letter is Required for Adoption of this System

Construction Details (Table III)

The use of this insulation system is limited to the combination of materials specified below. Where more than one item is designated under insulation function, they may be used together, unless otherwise indicated, or they may be used as alternates to one another. Functions designated "optional" are not necessarily required for every design. Insulation thicknesses and/or layers below indicated are minimum.

Filament Wire

Additional Ground & Interwinding insulation ***is not*** required to separate this winding from other windings or between this winding and grounded/dead metal
Recognized Component Single and Multi-Layer Insulated Winding Wire (OBJT2) listed below
Recognized Component Appliance Wiring Material (AVLV2) listed below
Unless otherwise noted, winding wire types listed below may be used in combination within a single product

HOI LUEN ELECTRICAL MFR CO LTD [E257525] - Recognized Component		
FIW(x)-B	2 (0.05)	
FIW(x)-F	2 (0.05)	
P LEO & CO LTD [E491285] - Recognized Component		
FIW-X B[a]	2 (0.05)	
FIW-X F[a]	2 (0.05)	
TOTOKU ELECTRIC CO LTD [E166483] - Recognized Component		
TIW-2LZX$+, TIW-2LZXY$+	2.8 (0.07)	Litz Wire of TIW-2X
TIW-2SBX$+, TIW-2LZSBX@@@%$+	2.8 (0.07)	Litz Wire of TIW-2SB
TIW-2SLZX$+, TIW-2SLZXY$+	2.8 (0.07)	Litz Wire of TIW-2SX
TIW-2SX$+, TIW-2SXY$+	2.8 (0.07)	
TIW-2X$+, TIW-2XY$+	2.8 (0.07)	
YOSHIKURA TECHNO CO LTD [E353894] - Recognized Component		
KFIW(x)-B	2 (0.05)	
KFIW(x)-F	2 (0.05)	

VDE

VDE Prüf- und Zertifizierungsinstitut

GUTACHTEN MIT FERTIGUNGSÜBERWACHUNG
CERTIFICATE OF CONFORMITY WITH FACTORY SURVEILLANCE

Yoshikura Techno Co., Ltd.
3F, TTD BLDG, 1-2-18 Minatoku
Tokyo 108-0073
Japan

ist berechtigt, für ihr Produkt /
is authorized to use for their product
Zubehör für Transformatoren
Accessories for transformers

die hier abgebildeten markenrechtlich geschützten Zeichen
für die ab Blatt 2 aufgeführten Typen zu benutzen /
the legally protected Marks as shown below for the types referred to on page 2 ff.

VDE REG F885 oder/or VDE oder/or VDE-REG F885
REG F885

Geprüft und zertifiziert nach /
Tested and certified according to

DIN EN 60317-0-7:2018-08; EN 60317-0-7:2017
DIN EN 60317-56:2018-05; EN 60317-56:2017
DIN EN 60851-5:2012-04; EN 60851-5:2008 + A1:2011

Aktenzeichen: 5015429-3310-0001 / 271987
File ref.:

VDE Prüf- und Zertifizierungsinstitut GmbH
VDE Testing and Certification Institute
Zertifizierungsstelle / *Certification*

Ausweis-Nr. 40051837 Blatt 1
Certificate No. *Page*
Weitere Bedingungen siehe Rückseite und Folgeblätter /
further conditions see overleaf and following pages
Offenbach, 2020-05-15

C. Heine

VDE Zertifikate sind nur gültig wie Veröffentlichung unter: http://www.vde.com/zertifikat
VDE certificates are valid only when published on: *http://www.vde.com/certificate*

VDE

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VDE Prüf- und Zertifizierungsinstitut
Gutachten mit Fertigungsüberwachung

Ausweis-Nr. / *Certificate No.* 40051837 Blatt / *Page* 2

Name und Sitz des Genehmigungs-Inhabers / *Name and registered seat of the Certificate holder*
Yoshikura Techno Co., Ltd., 3F, TTD BLDG, 1-2-18 Minatoku, TOKYO 108-0073, JAPAN

Aktenzeichen / *File ref.*
5015429-3310-0001 / 271987 / TL1 / GE

Datum / *Date*
2020-05-15

Dieses Blatt gilt nur in Verbindung mit Blatt 1 des Gutachtens mit Fertigungsüberwachung Nr. 40051837.
This supplement is only valid in conjunction with page 1 of the Certificate of Conformity with factory surveillance No. 40051837.

Zubehör für Transformatoren
Accessories for transformers

Typ(en) / *Type(s)*

1) **KFIW3-B, KFIW3-F**
2) **KFIW4-B, KFIW4-F**
3) **KFIW5-B, KFIW5-F**
4) **KFIW6-B, KFIW6-F**
5) **KFIW7-B, KFIW7-F**
6) **KFIW8-B, KFIW8-F**
7) **KFIW9-B, KFIW9-F**

Warenzeicheninhaber *Trademark holder*	Yoshikura Techno Co., Ltd.
Hinweis *Notice*	Die Drähte sind geeignet zur Verwendung in Transformatoren gemäß der Normenreihe IEC 61558. *The wires are suitable for use in transformers according to the IEC 61558 series of standards.* Die Drähte sind geeignet zur Verwendung in Transformatoren gemäß der Norm IEC 62368-1. *The wires are suitable for use in transformers in accordance with the IEC 62368-1 standard.*
Weitere Angaben siehe Anlage Nr. *Further information see appendix no.*	200/2020-05-15

VDE Prüf- und Zertifizierungsinstitut GmbH
VDE Testing and Certification Institute
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Section TL1

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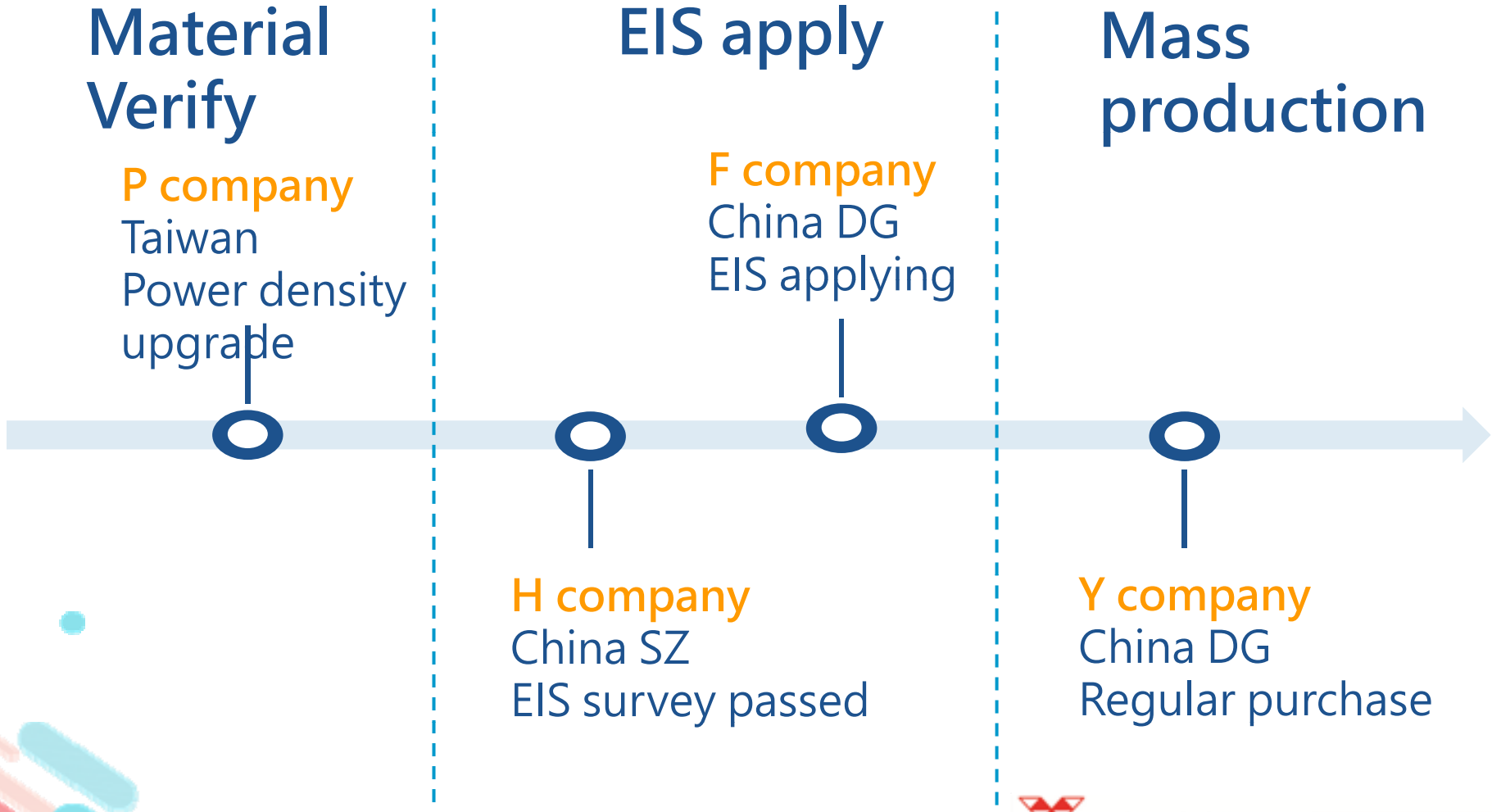
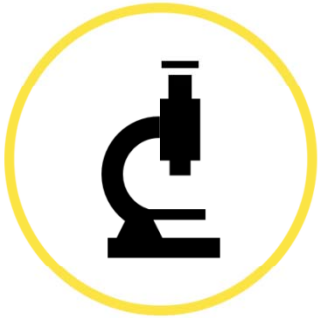
Project information sharing

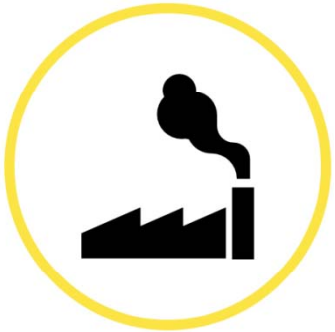


Conclusion



Design

- Winding smaller
  ➔transformer down size
- Increase winding space
  ➔power density up
  ➔ Flexible design



Production

- No strip soldering
  ➔process & labor cost saving
- Lowe solder damage
  ➔tube demand decrease
- Lower soldering temp.
  ➔saving the cost
- Automatic winding apply

Purchase

- Down size design
  ➔total cost reduction
- Power density increase
  ➔Product value increase

Yoshikura Techno

ありがとうございました！

Thank you！

謝謝！

Yoshikura Techno