

DATA SHEET

GEN series ISOBE5600m Isolated Transient Recorder

SPECIAL FEATURES

- 4 analog channels
- Isolated, unbalanced differential inputs
- ± 100 mV to ± 50 V input ranges
- ISOBE5600t battery powered
- ISOBE5600tm continuous power; 1.8 kV RMS isolation
- Digital fiber optic link
- Metal BNC inputs
- Cost-effective
- Analog-in to digital storage
- Isolated Transient Recorder



ISOBE5600m Functions and Benefits

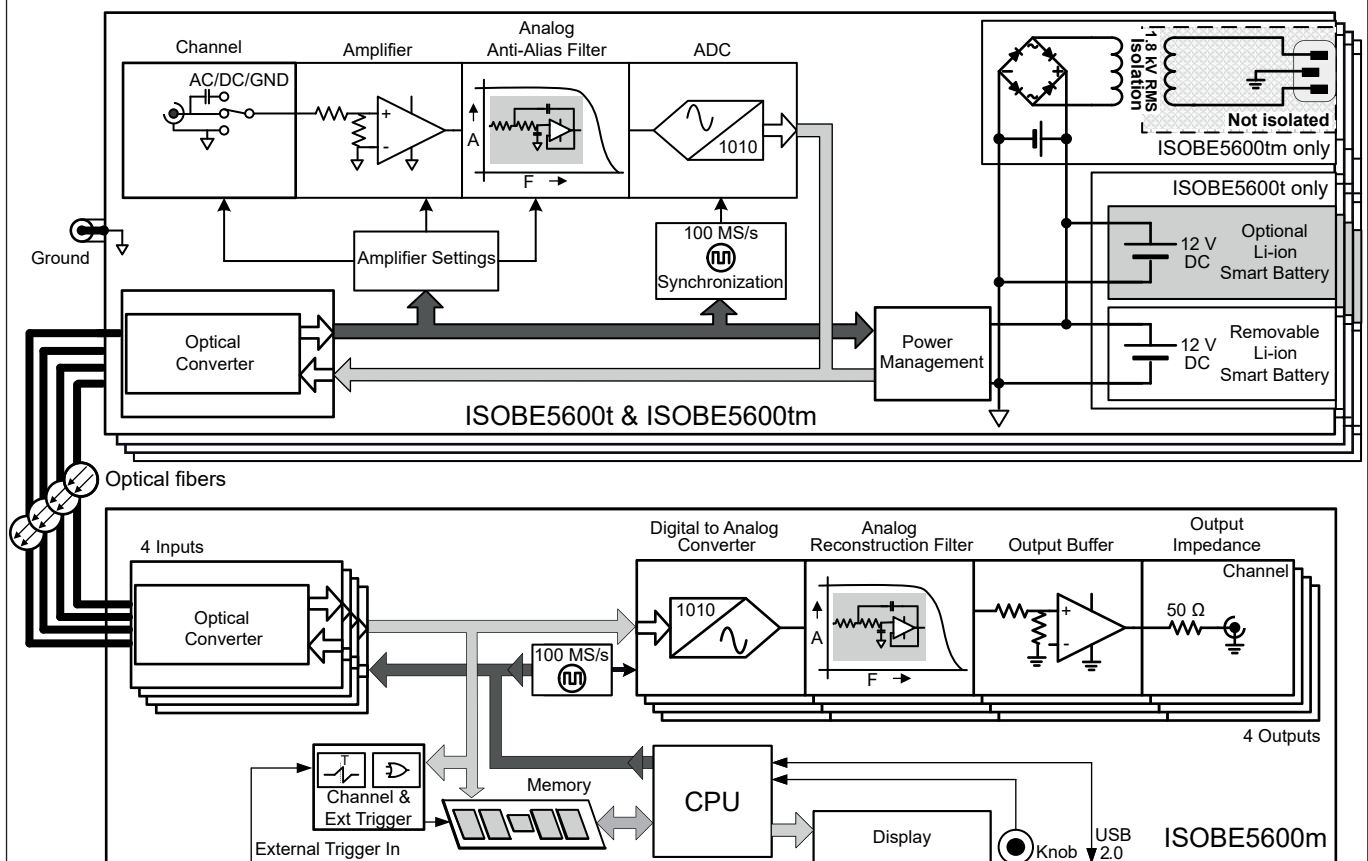
Offers fiber optic isolation for high speed transient recorder applications. The ISOBE5600m isolated transient recorder consists of a transmitter unit (ISOBE5600t or ISOBE5600tm) connected via fiber optic cable to the ISOBE5600m receiver. Connected to a PC using a USB 2.0 port, full setup and transient recorder control is to be supported by the proven Perception⁽¹⁾ software. For optional stand alone operation the receiver unit supports front panel controls and one analog output per transmitter.

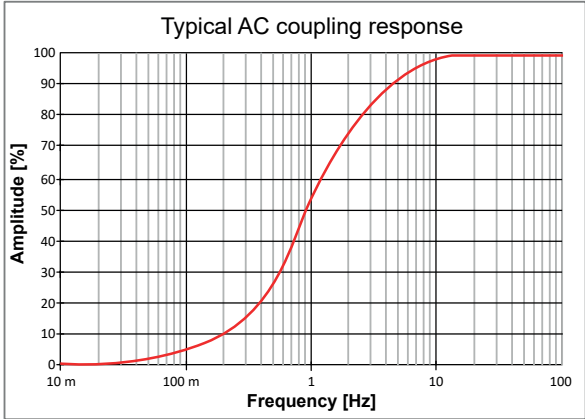
The ISOBE5600tm offers 1.8 kV RMS continuous powered isolation, while the ISOBE5600t offers higher isolation options using battery power. Using the one battery option, the ISOBE5600t has a 15 hour operation time. Using the optional second battery extends operation time to 30 hours.

⁽¹⁾ ISOBE5600t/tm/m/r do not support Perception software version 8.00 or higher.

Capabilities Overview

Receiver model	ISOBE5600m
Transmitter models	ISOBE5600t and ISOBE5600tm
Maximum sample rate per channel	100 MS/s (ADC and DAC)
ADC resolution	14 bit (ADC and DAC)
Memory per receiver	128 MS (256 MB)
Analog channels	4 outputs per receiver. One output per transmitter 1 input per transmitter
Isolation	Yes; transmitter to receiver and transmitter to earth
Input type	Isolated, unbalanced differential inputs
Probes	Not supported
Sensors	Not supported
TEDS	Not supported
Real-time cycle based calculators	Not supported
Real-time formula database calculators (option)	Not supported
EtherCat® output	Not supported
Digital Event/Timer/Counter	Not supported

ISOBE5600 Block Diagram

Figure 1: Block Diagram ISOBE5600m

Analog Input ISOBE5600t & ISOBE5600tm (Transmitter)	
Channels	1
Connector	1; Metal BNC
Input type	Single-ended to isolated common (unbalanced differential)
Input Coupling	
Coupling modes	AC / DC / GND
AC coupling frequency	1.6 Hz ($\pm 10\%$); - 3 dB
	
Figure 2: Typical AC coupling response	
Impedance	1 M Ω ($\pm 2\%$) // 38 pF ($\pm 5\%$)
Ranges	± 100 mV, ± 200 mV, ± 500 mV, ± 1 V, ± 2 V, ± 5 V, ± 10 V, ± 20 V and ± 50 V
Range error (DC Offset)	
Wideband	0.1% of Full Scale ± 50 μ V
Bessel filter	0.1% of Full Scale ± 50 μ V
Offset error drift	ISOBE5600t: $\pm(60 \text{ ppm} + 10 \text{ } \mu\text{V})/^{\circ}\text{C}$ ($\pm(36 \text{ ppm} + 6 \text{ } \mu\text{V})/^{\circ}\text{F}$) ISOBE5600tm: $\pm(100 \text{ ppm} + 10 \text{ } \mu\text{V})/^{\circ}\text{C}$ ($\pm(60 \text{ ppm} + 6 \text{ } \mu\text{V})/^{\circ}\text{F}$)
Reading error (DC Gain)	
Wideband	0.1% of reading ± 50 μ V
Bessel filter	0.1% of reading ± 50 μ V
Gain error drift	ISOBE5600t: $\pm 100 \text{ ppm}/^{\circ}\text{C}$ ($\pm 60 \text{ ppm}/^{\circ}\text{F}$) ISOBE5600tm: $\pm(100 \text{ ppm} + 10 \text{ } \mu\text{V})/^{\circ}\text{C}$ ($\pm(60 \text{ ppm} + 6 \text{ } \mu\text{V})/^{\circ}\text{F}$)
RMS Noise (50 Ω terminated)	
Wideband	0.05% of Full Scale ± 100 μ V
Bessel filter	0.05% of Full Scale ± 100 μ V
Bandwidth	> 25 MHz @ - 3 dB
Anti-alias filter	Lowpass at 10 MHz; ± 1 MHz 6 th order Bessel
CMRR	100 dB @ 80 Hz
Input Bias current	< 2 nA
Rise time	14 ns
Input overload protection	
Maximum nondestructive voltage	± 125 V DC; Ranges < ± 2 V ± 250 V DC; Ranges $\geq \pm 2$ V
Overload recovery time	Restored to 0.1% accuracy in less than 50 ns after 200% overload Restored to 10% accuracy in less than 10 ns after 200% overload

Channel to Channel Phase Match

Using different filter selections (Wideband or Bessel) will lead to phase mismatches between channels

Channel to Channel phase difference	Maximum 10 ns; using identical optical cable lengths
Cable length compensation	No
Cable delay	5 ns/m

Triggering

Channel trigger	1 fully independent per channel
Pre- and post-trigger length	0 to full memory
Trigger rate	1 trigger per recording
Manual trigger (Software)	Supported

External Trigger In

Selectable (Software)	Rising/Falling edge or Off
Minimum pulse width	500 ns
Trigger in delay	± 1 sample period

Analog channel trigger

Levels	2 level detectors
Resolution	16 bit (0.0015%); for each level
Direction	Rising/Falling; single direction control for both levels based on selected mode
Hysteresis	Fixed 0.03% of Full Scale (defines the trigger noise sensitivity)

Analog channel trigger modes

Basic	POS or NEG crossing; single level
Dual level	One POS and one NEG crossing; two individual levels, logical OR

Acquisition Mode

Single sweep	Triggered acquisition to on-board memory without sample rate limitations; for single transients or intermittent phenomena. No aggregate sample rate limitations.
Maximum sweep memory	32 MS/channel
Maximum sweep sample rate	100 MS/s
Pre-trigger segment	0% to 100% of selected sweep length If trigger occurs before pre-trigger segment is recorded, pre-trigger segment is truncated to recorded data only
Sweep stretch	Not supported

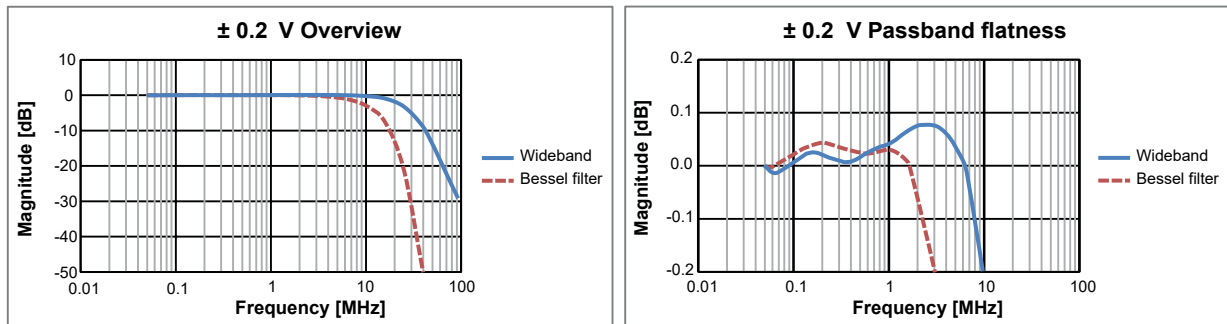
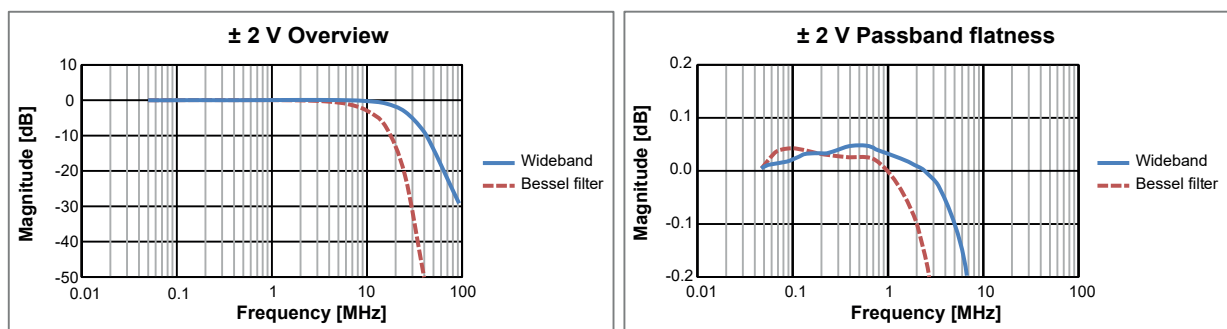
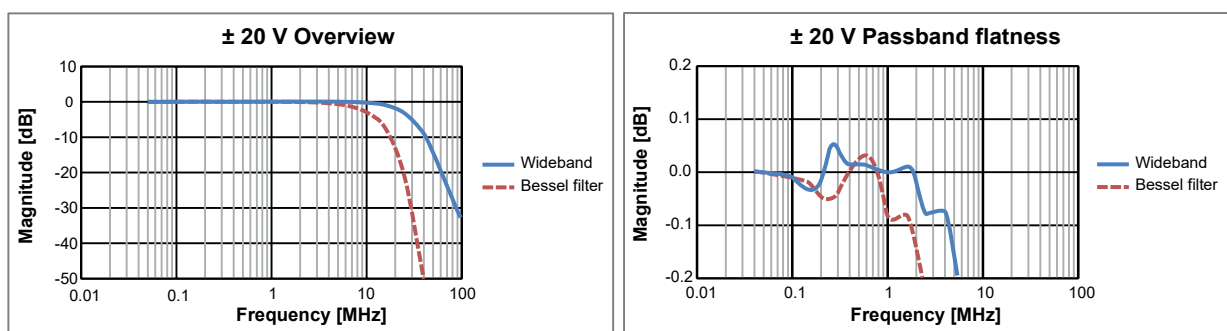
Fiber Optic Link

Connector	LC duplex
Light source	
Laser	Class 1 laser product
Transfer rate	2 Gbit/s
Wavelength	850 nm
Cable	
Isolation	10^{15} Ω /m
Maximum length	50 m (164 ft); using ISO/IEC 11801 type OM2, OM3 or OM4 cable and no extra couplers ⁽¹⁾
Type	Duplex Multi Mode, 50/125 μ m, ISO/IEC 11801 type OM2

 (1) Other fiber cable lengths can be ordered from custom systems at: customsystems@hbkworld.com

ISOBE5600 Analog-in to Analog-out

Bandwidth	20 MHz @ - 3 dB (wideband) 10 MHz @ - 3 dB (filtered)
Pass band flatness (wideband)	± 0.3 dB ($\pm 3.4\%$); DC to 1 MHz ± 1 dB ($\pm 11\%$); 1 MHz to 10 MHz
Rise time (wideband)	18 ns
CMRR	100 dB @ 80 Hz
Range error (DC Offset)	0.3% Full Scale ± 50 μ V RTI ⁽¹⁾
Noise (RMS)	0.07% Full Scale ± 0.1 mV RTI ⁽¹⁾
Non-linearity	$\pm 0.05\%$
Propagation delay	650 ns ± 50 ns from input to output with 1 meter of optical cable 5 ns per added meter of additional cable length

Figure 3: Typical ± 0.2 V Overview and passband flatnessFigure 4: Typical ± 2 V Overview and passband flatnessFigure 5: Typical ± 20 V Overview and passband flatness

(1) RTI: Referred to Input

Analog Output ISOBE5600m (Receiver)	
Channels	4; 1 per transmitter channel (ISOBE5600t and/or ISOBE5600tm)
Connector	4; Metal BNC, one BNC per channel on receiver front panel
Conversion	100 MS/s DAC (digital to analog converter) per channel
DAC resolution	14 bit (0.006%)
Outputs	
Output filter	Lowpass 40 MHz @ – 3 dB; 6 th order Bessel reconstruction filter
Output impedance	50 Ω \pm 2%
Calibrated Full Scale output level	\pm 2 V; 1 M Ω load
Non calibrated Full Scale output level	\pm 1 V; 50 Ω load (Additional output error: add 1% + 1/2 of the error of load resistor)

Power Requirement (ISOBE5600t)	
Battery powered	Maximum 2 removable batteries possible Note Use HBM approved batteries only. See option G034 for approved battery details.
Power consumption	6 VA typical, 8 VA maximum
Operation Time (using G034 batteries)	15 hours; 1 battery installed (30 hours; 2 batteries installed)

Power Requirement (ISOBE5600tm)	
Fuse(s)	2 x 250 mA; Slow blow
Battery	
Capacity	12 V @ 300 mAh; Internal, rechargeable, NiMH
Battery back-up time	5 minutes (with new and fully charged battery)
Power	
Power supply input (manual voltage selector)	47-63 Hz, 115/230 V AC (\pm 10% of selected power input voltage)
Power consumption	12 VA maximum
Overvoltage category mains	OVC II
Power supply isolation	
Ground terminal connected to protective ground	0 V, both sides grounded
Ground terminal floating	1.8 kV RMS (IEC 61010-1) Requires a protected LAB environment and EN50191 compliant work procedures

Power Requirement (ISOBE5600m)	
Fuse(s)	2 x 1 A, 5 x 20 mm; Slow blow (T)
Power	
Power supply input	47-63 Hz, 115-230 V AC (\pm 10% of selected power input voltage)
Power consumption	40 VA maximum
Overvoltage category mains	OVC II

Physical, Weight and Dimensions ISOBE5600t

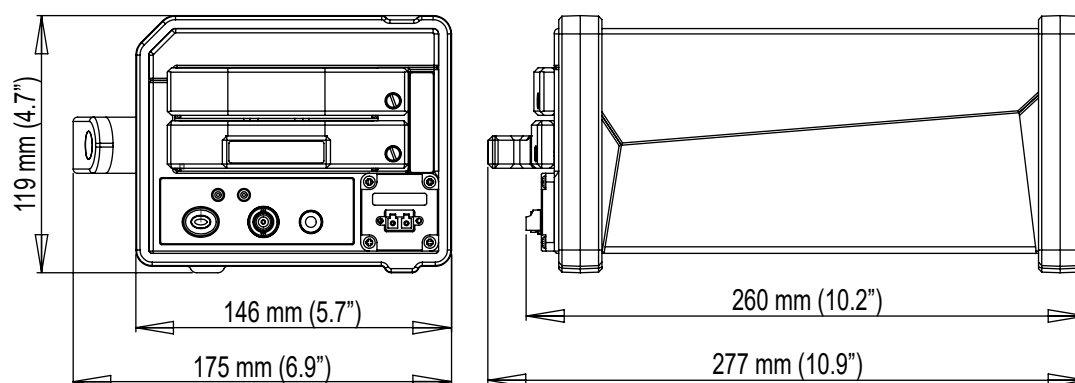
Shielding and casing	Single metal shielding in plastic housing. Correct operation has been verified by placing the transmitter cabinet within 1 meter of an EMC field created by a 80 kA current
Cooling Fans	0
Handle	One carrying handle
Ground terminal	M6 screw

Weight

Mainframe	4.6 kg (10 lb) including two batteries
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Dimensions

Height with handle	119 mm (4.7")
Width	175 mm (6.9")
Depth	277 mm (10.9")

**Figure 6:** Dimensions ISOBE5600t transmitter**Physical, Weight and Dimensions ISOBE5600tm**

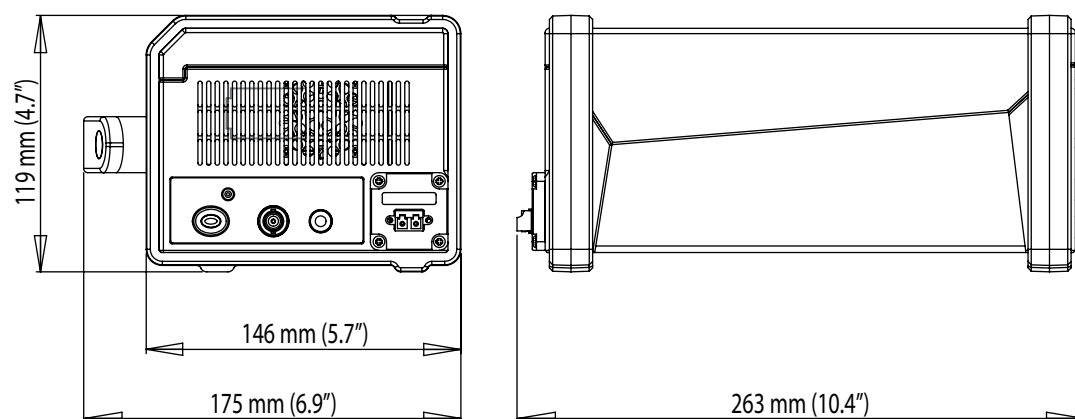
Shielding and casing	Single metal shielding in plastic housing. Correct operation has been verified by placing the transmitter cabinet within 1 meter of an EMC field created by a 80 kA current
Cooling Fans	1
Handle	One carrying handle
Ground terminal	M6 screw

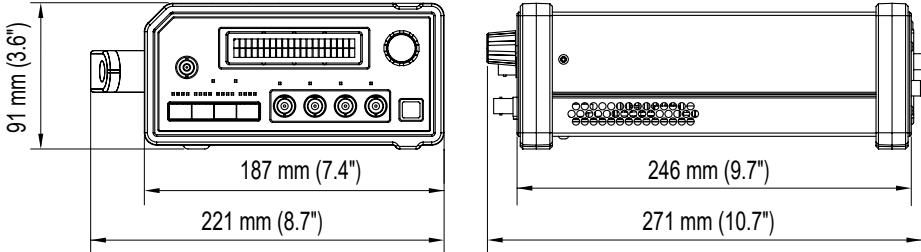
Weight

Mainframe	3 kg (6.6 lb)
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Dimensions

Height with handle	119 mm (4.7")
Width	175 mm (6.9")
Depth	263 mm (10.4")


**Figure 7:** Dimensions ISOBE5600tm transmitter

Physical, Weight and Dimensions (ISOBE5600m)	
Casing	Metal housing with rubber band. Rubber band includes feet and stacking holes.
Cooling Fans	1
Handle	One carrying handle
Protective ground	4 mm Banana plug
Weight	
Mainframe	1.4 kg (3.0 lb)
Dimensions	
Height	91 mm (3.58")
Width	221 mm (8.70")
Depth	271 mm (10.67")
	
Figure 8: Dimensions ISOBE5600r/ISOBE5600m receiver	

IOBE5600 Environmental Specifications

Temperature Range	
Operational	ISOBE5600t transmitter: -15 °C to +50 °C (+5 °F to +122 °F) ISOBE5600tm transmitter: 0 °C to +40 °C (+32 °F to +104 °F) ISOBE5600r receiver: 0 °C to +40 °C (+32 °F to +104 °F)
Non-operational (Storage)	-25 °C to +70 °C (-13 °F to +158 °F)
Thermal protection	Automatic thermal shutdown at 85 °C (+185 °F) internal temperature Audio user warning notifications on receiver at 75 °C (+167 °F)
Relative humidity	0% to 80%; non-condensing; operational
Ingress protection class	IP20
Operating environment	Indoor, pollution degree 2
Altitude	Maximum 2000 m (6562 ft) above sea level; operational
Shock: IEC 60068-2-27	
Operational	Half-sine 10 g/11 ms; 3-axis, 1000 shocks in positive and negative direction
Non-operational	Half-sine 25 g/6 ms; 3-axis, 3 shocks in positive and negative direction
Vibration: IEC 60068-2-64	
Operational	1 g RMS, ½ h; 3-axis, random 5 to 500 Hz
Non-operational	2 g RMS, 1 h; 3-axis, random 5 to 500 Hz
Operational Environmental Tests	
Cold test IEC60068-2-1 Test Ad	-5 °C (+23 °F) for 2 hours
Dry heat test IEC 60068-2-2 Test Bd	+40 °C (+104 °F) for 2 hours
Damp heat test IEC60068-2-3 Test Ca	+40 °C (+104 °F), humidity > 93% RH for 4 days
Non-Operational (Storage) Environmental Tests	
Cold test IEC-60068-2-1 Test Ab	-25 °C (-13 °F) for 72 hours
Dry heat test IEC-60068-2-2 Test Bb	+70 °C (+158 °F) humidity < 50% RH for 96 hours
Change of temperature test IEC60068-2-14 Test Na	-25 °C to +70 °C (-13 °F to +158 °F) 5 cycles, rate 2 to 3 minutes, dwell time 3 hours
Damp heat cyclic test IEC60068-2-30 Test Db variant 1	+25 °C/+40 °C (+77 °F/+104 °F), humidity > 95/90% RH 6 cycles, cycle duration 24 hours

Harmonized Standards for CE and UKCA Compliance, According to the Following Directives ⁽¹⁾	
Low Voltage Directive (LVD): 2014/35/EU	
Electromagnetic Compatibility Directive (EMC): 2014/30/EU	
Electrical Safety	
EN 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use - General requirements
EN 61010-2-030	Particular requirements for testing and measuring circuits
Electromagnetic Compatibility	
EN 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
Emission	
EN 55011	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics Conducted disturbance: class B; Radiated disturbance: class A
EN 61000-3-2	Limits for harmonic current emissions: class D
EN 61000-3-3	Limitation of voltage changes, voltage fluctuations and flicker in public low voltage supply systems
Immunity	
EN 61000-4-2	Electrostatic discharge immunity test (ESD); contact discharge ± 4 kV/air discharge ± 8 kV: performance criteria B
EN 61000-4-3	Radiated, radio-frequency, electromagnetic field immunity test; 80 MHz to 2.7 GHz using 10 V/m, 1000 Hz AM: performance criteria A
EN 61000-4-4	Electrical fast transient/burst immunity test Mains ± 2 kV using coupling network. Channel ± 2 kV using capacitive clamp: performance criteria B
EN 61000-4-5	Surge immunity test Mains ± 0.5 kV/ ± 1 kV Line-Line and ± 0.5 kV/ ± 1 kV/ ± 2 kV Line-earth
EN 61000-4-6	Immunity to conducted disturbances, induced by radio-frequency fields 150 kHz to 80 MHz, 1000 Hz AM; 10 V RMS @ mains, 10 V RMS @ channel, both using clamp: performance criteria A
EN 61000-4-11	Voltage dips, short interruptions and voltage variations immunity tests Dips: performance criteria A; Interruptions: performance criteria C

- (1)  The manufacturer declares on its sole responsibility that the product is in conformity with the essential requirements of the applicable UK legislation and that the relevant conformity assessment procedures have been fulfilled.

Manufacturer:

Hottinger Brüel & Kjaer GmbH
Im Tiefen See 45
64293 Darmstadt
Germany

Importer:

Hottinger Brüel & Kjaer UK Ltd.
Technology Centre Advanced Manufacturing Park
Brunel Way Catcliffe
Rotherham
South Yorkshire
S60 5WG
United Kingdom

G034: Rechargeable Li-ion SM202 Battery (Option, to be ordered separately)

Note Local regulations don't allow HBM to import batteries to several countries. These regulations change regularly and are increasingly becoming more strict. Check with the local HBM office before ordering the battery from HBM. Use only HBM approved batteries to avoid unexpected failures and/or specification deviations. G034 batteries have almost all world-wide approvals and are available for purchase locally in many countries. For more information, please refer to the following website: www.rrc-ps.com

Original manufacturers part number	RRC2020
Chemical system	Lithium Ion (Li-Ion)
Nominal voltage	11.25 V
Typical weight	490 g (1.1 lb)
Nominal capacity	8850 mAh
Capacity life expectancy @ 25 °C 4.40 A Charge/4.40 A Discharge	>300 cycles with minimum 80% of initial capacity
Mechanical form factor	SM202
Dimensions	149 mm (5.86") x 89 mm (3.50") x 19.7 mm (0.77") (D x W x H)
Smart battery	SMBus & SBDS revision 1.1 Compliant
Maximum charge voltage	13.0 V
Recommended maximum charge current	4.0 A
Typical charging time	3 hours @ charging current of 4 A
Discharge temperature	-20 °C to +55 °C (-4 °F to +131 °F)
Charge temperature	+0 °C to +40 °C (+32 °F to +104 °F)
Storage temperature	-20 °C to +60 °C (-4 °F to +140 °F). Recommended -20 °C to +20 °C (-4 °F to +68 °F)
Original manufacturer's part number	RRC power solutions RRC2020
Compliance information	CE / UL2054 / FCC / PSE / KC / Gost / EAC / CQC / RCM / IEC62133 / UN38.3 / RoHS / REACH / BIS
Availability	Available in most countries worldwide
Recycling	Registered with many recycling systems worldwide



Figure 9: G034 Battery

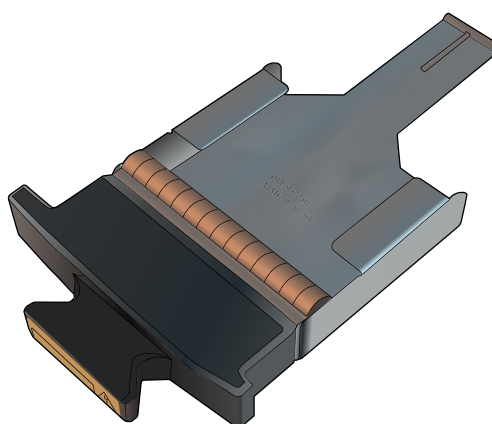


Figure 10: G301 Battery carrier


G109: Li-ion Battery Charger (Option, to be ordered separately)	
Li-ion two-bay battery charger	
Smart battery support	SmBus Level 3
Maximum charge current	3 A, or limited by smart battery
Battery recalibration	SmBus 1.2 A @ 12 V
Charge strategy	Simultaneous for two batteries
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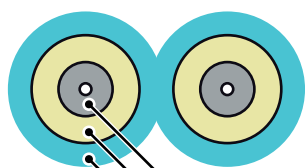
Figure 11: Two-bay Li-ion battery charger

KAB280: Fiber Optic Cable MM 50/125 μ m LC-LC (Option, to be ordered separately)

Standard zipcord fiber optic duplex Multi Mode patch cable

Used with 850 nm optical 1 Gbit or 10 Gbit Ethernet (1-G091 and 1-G065), Master/Sync, GN1202B and GN800B cards.

Typically used for fixed cable routing or LAB environments.

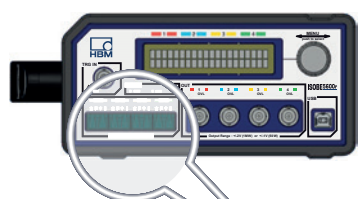


Tight buffered fiber
Aramid yarn
Outer jacket

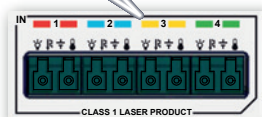


Figure 12: Block diagram and image

Connector type	LC - LC
Cable rating	OM3; Multi Mode, 850 nm
Core/Cladding diameter	50/125 μ m
Jacket size/diameter	Typically 2 mm (0.08") single core
Jacket rating	Low-smoke zero-halogen
Attenuation	≤ 2.7 dB/km @ 850 nm
Available lengths	3, 10, 20 and 50 m (10, 33, 66 and 164 ft). For other lengths contact custom systems ⁽¹⁾ .
Bend radius	30 mm (1.2")
Weight	Typically 14 kg/km (9 lb/1000 ft)
Operating temperature	-40 °C to +80 °C (-40 °F to 176 °F)

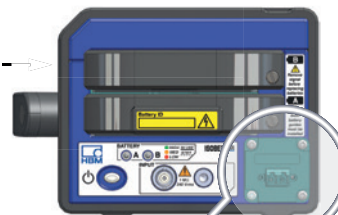
Control Room

Receiver



LC connector

1-KAB280-XXX

Test Area




Transmitter

LC connector



Figure 13: Application area of a fiber optic duplex cable (Example 1)

(1) Contact custom systems at: customsystems@hbkworld.com

Ordering Information ⁽¹⁾		
Article	Description	Order No.
ISOBE5600t 1 ch Transmitter	 <p>ISOBE5600t transmitter HV, 100 MS/s, 14 bit, 25 MHz, two Li-ion battery holders, LC connector. Note Batteries need to be ordered separately. Check the import restrictions before ordering batteries from HBM. Use only HBM approved batteries to avoid unexpected failures and/or specification deviations.</p>	1-GENIS-1T
ISOBE5600tm 1 ch Transmitter	 <p>ISOBE5600tm transmitter MV, 100 MS/s, 14 bit, 25 MHz, built-in power supply with 1.8 kV RMS isolation, LC connector.</p>	1-GENIS-1TM
ISOBE5600m 4 ch Receiver	 <p>ISOBE5600m receiver, 4 channels, 4 x LC in, 4 x BNC out, LCD display for channel setup transient recorder, 32 MB per channel transient memory. Analog bandwidth in transient recorder mode 25 MHz.</p>	1-GENIS-4M

(1) All ISOBE5600 systems are intended for exclusive professional and industrial use.

Accessories, to be ordered separately

Article		Description	Order No.
Li-ion SM202 Battery		Rechargeable Li-ion battery unit for GN110/ GN111 and ISOBE5600t The battery is compliant with CE / UL 2054 / UL1642 / FCC / IEC 62133 / EN 60950 / RoHS / UN 38.3 / PSE / RCM / CQC / BIS IS 160346 Note Check the import restrictions before ordering batteries from HBM.	1-G034
Battery carrier		Li-ion battery carrier for GN110/GN111 and ISOBE5600t. Battery (1-G034) not included.	1-G301
2 bay Li-ion battery charger		Li-ion two bay battery charger for GN110/ GN111 and ISOBE5600t batteries. Accepts two batteries without removing the carrier.	1-G109
Fiber cable MM LC-LC		GEN DAQ standard zipcord fiber optic duplex Multi Mode 50/125 µm cable, 3.0 dB/km loss, LC-LC connectors, aqua, ISO/IEC 11801 type OM3. Typically used for fixed cable routing or LAB environments. Lengths: 3, 10, 20 and 50 meters (10, 33, 66 and 164 ft) Used with 850 nm optical 1 Gbit Ethernet (1-G091), 10 Gbit Ethernet (1-G065), Master/ Sync, GN1202B- and GN800B cards.	1-KAB280-3 1-KAB280-10 1-KAB280-20 1-KAB280-50

Note Other fiber cable lengths can be ordered from custom systems at: customsystems@hbkworld.com

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They are not to be understood as a guarantee of quality or durability.