Technical Data

EV Relay

Safety is first priority with LSIS`s proven technology!

Starting with G7 EV (Electric Vehicle) Korean National project in 1993, LSIS has developed key EV components such as Power Control Unit (PCU), EV-relay and On Board Charger (OBC) equipped in pure electric vehicle (EV), hybrid electric vehicle (HEV), plug-in hybrid electric vehicle (PHEV) and fuel cell electric vehicle (FCEV). Our capability of manufacturing Power Control Unit (PCU) is derived from the 20 years of experience in electric power and automation/drive business. Also, our capability for developing and producing high voltage EV-Relay is through business experience over 30 years and domestic market share of 65% in magnetic contactor & circuit breaker. Because of our unique experience, safety and durability is our strength, and our ultimate target is to achieve zero accident caused by our product failure.

EV Relay

Features

Compact Design
Achieved overall compact size with short gap cutoff, charged with Hydrogen and Nitrogen Gas.

Proven Safety
High Short-time short circuit current with stand value.

Superior Reliability
Excellent performance with electrical and mechanical endurances.

Customizable
Relays are customizable to meet customers` requirements such as mounting position, etc.

Applications

High DC voltage applications such as
- Electric Vehicle
- Hybrid Vehicle
- Renewable Energy Storage
- Battery Charging System
- Fuel Cell & Solar System
- General-purpose Industrial Equipments

Model Number Structure

GER □ - □ □ □ □

❶ ❷ ❸ ❹ ❺ ❻

❶ Component
G : Global
E : Electric Vehicle
R : Relay

❷ Contact Rating
010 : 10A
040 : 40A
100 : 100A
150 : 150A
250 : 250A
400 : 400A

❸ Coil Voltage
12 : 12Vdc
24 : 24Vdc

❹ Customer
LS

❺ Model
ST

❻ Mount Type
SM : Side Mount
BM : Bottom Mount
PI : Plug-In type

Precautions

Safety Precautions

Specification range
Use that exceeds the specification ranges such as the coil rating, contact rating and switching life should be avoided. Doing so may lead to abnormal heating, smoke, and fire.

Installation, maintenance
Never touch live parts when power is applied to a relay. Doing so may cause electrical shock. When installing, maintaining, or trouble shooting, the power of relays and connecting parts such as terminals and sockets must be turned off.

Connection
Be warned that an incorrect connection may lead to unexpected operation error, abnormal heating, and fire.

Fail-safe
If the possibility exists that faulty adhesion or contact could endanger assets or human life, take double safety precautions and make sure that operation is foolproof.

Right Connection of HV Terminal
GER-Relays' contacts have polarity. Make sure to perform connections with the correct polarity as indicated on the frame. If the contacts are connected with the reverse polarity, the switching characteristics specified in this document cannot be assured.

Tightening Torque
Below torque guide must be followed.

M4 screw : 1.8 to 2.7 N·m
M5 screw : 3 to 4 N·m
M6 screw : 6 to 8 N·m
M8 screw : 10 to 12 N·m

Wire Size for HV connection

Model	Recommendation
GER010	2mm²
GER040	10mm²
GER100	35mm²
GER150	70mm²
GER250	150mm²
GER400	240mm²

Usage Ambient Condition
To maintain initial performance, do not drop or apply physical impact to the relay.

Under normal use, the relay is designed not to be detached. To maintain initial performance, the case should not be disassembled. Relay characteristics cannot be guaranteed if the case is removed.

Magnetism
If relays are proximately installed next to each other or installed near highly-magnetized parts such as motor or speaker, the operational characteristics might get changed or malfunction can happen. Hence, please verify this point in actual installation and operational condition.

Shock
It is ideal to mount the relay that the movement of the contacts and movable parts is perpendicular to the direction of the vibration or shock. Especially, note that the vibration and shock resistance of NC contacts while the coil is not excited is greatly affected by the mounting direction of the relay. Condensation could be formed when there is a sudden change in temperature under high temperature, high humidity conditions. Note that condensation may cause deterioration of the insulation, breaking of coil, and rusting.

Storage, Transpoation

Transportation
Relay's functional damage may occur if strong vibration, shock or heavy weight is applied to a relay during transportation of a device in which a relay is installed. Therefore, please pack them in a way, using shock-absorbing material, so that the allowable range for vibration and shock is not exceeded.

Storage
If the relay is stored for extended periods of time (including transportation period) at high temperatures or high humidity levels or in atmospheres with organic gas or sulfide gas, sulfide film or oxide film may be formed on surface of the contacts, which may cause contact instability, contact failure and functional failure. Please check the atmosphere in which the units are to be stored and transported.

Specifications

Model			GER010	GER040	GER100
Width x Height x Depth (mm)			34 x 44 .3x 28	67 x 47 x 35.3	80.7 x 70 x 39
Characteristics	Item		Specifications		
Contact	Contact Form		SPST-NO		
	Contact Structure		Double Break, Single		
	Contact Resistance		Max. 50mΩ	Max.10mΩ	Max. 2mΩ
	Short-time Current		15A (2min., 2mm²)	65A (15min.)	150A (15min., 35mm²)
			30A (30sec., 2mm²)	100A (2min.)	225A (2min., 35mm²)
	Max. Cut-off Current		-	400A @450V (1Cycle)	1,000A 450Vdc (1cycle)
	Reverse direction Cut - off			-40A 200V (5,000cycles)	-100A 200V (2,000cycles)
	Overload Interruption		15A 400VDC (10,000Cycles) 30A 400VDC (50Cycles)	120A 450VDC (100Cycles)	200A 450VDC (100cycles)
Coil	Rated Voltage		12V		
	Pick-up Voltage (@20℃)		75% Max. of Rated Voltage		
	Drop-out Voltage (@20℃)		10% Min. of Rated Voltage		
	Coil resistance (@20℃)		60.8	49.3	33
	Power Consumption		2.5W	3W	4.5W
	Max. Allowable Voltage		16VDC		
Electrical Characteristics	Operating Time (@20℃)		Max. 30ms		
	Release Time (@20℃)		Max. 10ms		
	Bounce Time (@20℃)		Max. 1ms	Max. 1.5ms	Max. 3ms
	Insulation Resistance (Initial)	Between Coil and Contacts	Min. 1,000MΩ (@500VDC)		
		Between Contacts of the Same Polarity			
	Dielectric Strength (Initial)	Between Coil and Contacts	2,500Vrms / min. (Detection Current :10mA)		
		Between Contacts of the Same Polarity			
	Impulse Withstand Voltage		4,500V		
Mechanical Characteristics	Shock Resistance	Functional	Min.196m/s² (20G)		
		Destructive	Min.490m/s² (50G)		
	Vibration Resistance	Functional	10 to 200 to 10, Min. 4.5G (Detection Time : 10 μs)		
		Destructive	10 to 200Hz, Min.4.5G (Time of vibration for each direction ; X, Y, Z Direction : 4hours)		
Expected Life	Mechanical		Min. 200,000ops.	Min. 200,000ops.	Min. 250,000ops.
	Electrical (Resistive Load)		-	450Vdc 40A, 5,000ops.	450Vdc 100A 2,000ops.
			-	450Vdc 30A, 10,000ops.	450Vdc 40A 30,000ops.
			400Vdc15A, 75,000ops. (only Making)	450Vdc 30A, 80,000ops. (only Making)	450Vdc 120A, 80,000ops. (only Making)
Ambient Operating Temp.			-40 ~ 85℃		
Ambient Operating Humidity			5 ~ 95% R.H.		
Weight			77g	140g	350g

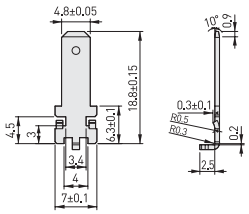
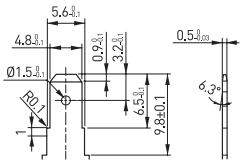
Note 1. Number of operations for overload interruption and expected life can change due to environmental conditions.
2. L/R ≤1ms for circuit setup.

Model			GER150	GER250	GER400
Width x Height x Depth (mm)			80.7 x 70 x 39	91.5 x 89 x 45	111 x 63 x 74.7
Characteristics	Item		Specifications		
Contact	Contact Form		SPST-NO		
	Contact Structure		Double Break, Single		
	Contact Resistance		Max. 2mΩ	Max. 1mΩ	Max. 1mΩ
	Short-time Current		225A (10min., 50mm²)	350A (10min., 100mm²)	600A (10min., 150mm²)
			320A (2min., 50mm²)	500A (2min., 100mm²)	900A (2min., 150mm²)
	Max. Cut-off Current		1,500A 450Vdc (1cycle)	2,500A 450Vdc (1cycle)	3,200A 450Vdc (1cycle)
	Reverse direction Cut-off		-150A 200V (1,500cycles)	-250A 200V (5,000cycles)	-100A 200V (2,000cycles)
	Overload Interruption		300A 450VDC (100cycles)	400A 450VDC (100cycles)	800A 450VDC (300cycles)
Coil	Rated Voltage		12V	12V (24V)	
	Pick-up Voltage (@20℃)		75% Max. of Rated Voltage		
	Drop-out Voltage (@20℃)		10% Min. of Rated Voltage		
	Coil resistance (@20℃)		23.5	38.9	38.2
	Power Consumption		6W	4W (*Inrush current : 2.5A for 12V)	4W (*Inrush current : 3A for 12V)
	Max. Allowable Voltage		16VDC		
Electrical Characteristics	Operating Time (@20℃)		Max. 30ms		
	Release Time (@20℃)		Max. 10ms		
	Bounce Time (@20℃)		Max. 2ms	Max. 3ms	Max. 3ms
	Insulation Resistance (Initial)	Between Coil and Contacts	Min. 1,000MΩ (@500Vdc)		
		Between Contacts of the Same Polarity			
	Dielectric Strength (Initial)	Between Coil and Contacts	2,500Vrms/min (Detection Current : 10mA)		
		Between Contacts of the Same Polarity			
	Impulse Withstand Voltage		4,500V		
Mechanical Characteristics	Shock Resistance	Functional	Min.196m/s²(20G)		
		Destructive	Min.490m/s²(50G)		
	Vibration Resistance	Functional	10 to 200 increments of 10, Min. 4.5G (Detection Time : 10 μs)		
		Destructive	10 to 200Hz, Min.4.5G (Time of vibration for each direction ; X, Y, Z Direction : 4hours)		
Expected Life	Mechanical		Min. 300,000ops.	Min. 300,000ops.	Min. 300,000ops.
	Electrical (Resistive Load)		450Vdc 150A 1,500ops.	450Vdc 250A 3,000ops.	450Vdc 400A 2,000ops. 450Vdc 200A 10,000ops.
			400VDC 15A 8,0000ops.	400VDC 100A 10,000ops.	450VDC 200A 10,000ops
			-	-	450VDC 40A 80,000ops
Ambient Operating Temp.			-40 ~ 85℃		
Ambient Operating Humidity			5 ~ 95% R.H.		
Weight			380g	500g	700g

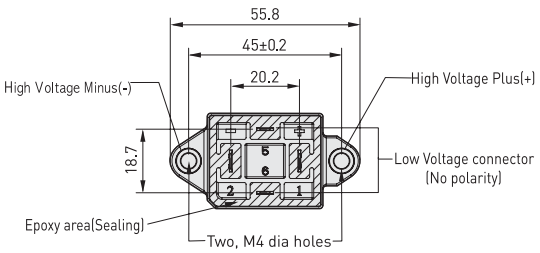
Note 1. Number of operations for overload interruption and expected life can change due to environmental conditions.
2. L/R ≤1ms for circuit setup.

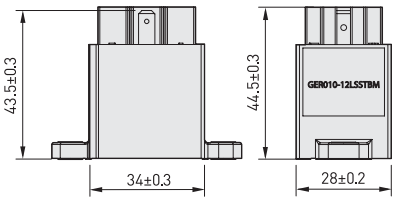
GER 010

Terminal

HV terminal	LV terminal
	
Pin Type Features: • Terminal Type = Tab • Mating Area Interface Dimensions (mm) 6.3x 0.50 • Material = Brass **Applicable Connector:** • Terminal Type = Receptacle3 • Tyco 63445-2	**Pin Type Features:** • Terminal Type = Tab • Mating Area Interface Dimensions (mm) 4.8 X 0.50 • Material = Brass **Applicable Connector:** • Terminal Type = Receptacle • Tyco 9-160481-x Series • Tyco 1-160477-x Series

Dimensions

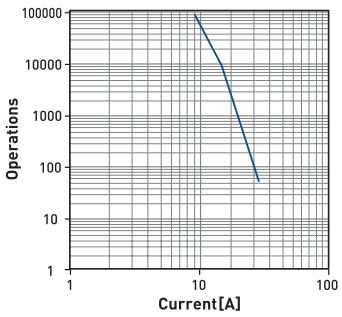




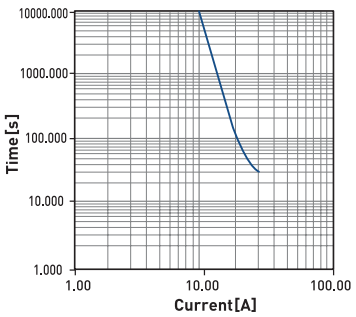
General Tolerance
less than 10 : ±0.25
10~50 : ±0.5
more than 50 : ±0.8

Engineering Data

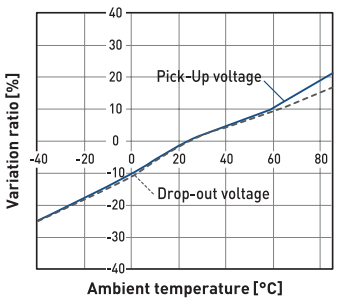
Cut-off life curve



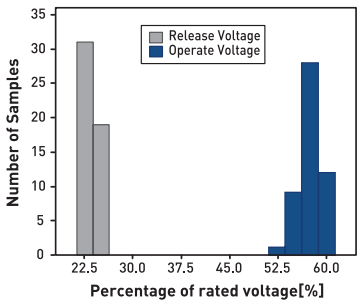
Switching life curve



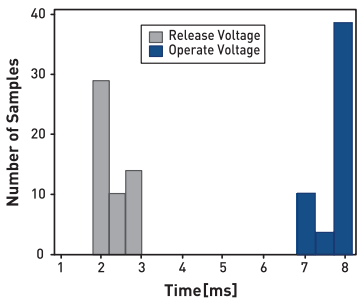
Ambient temperature characteristics



Low Voltage distribution



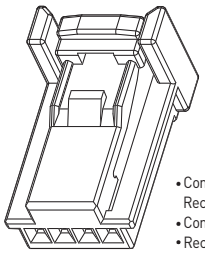
Time distribution



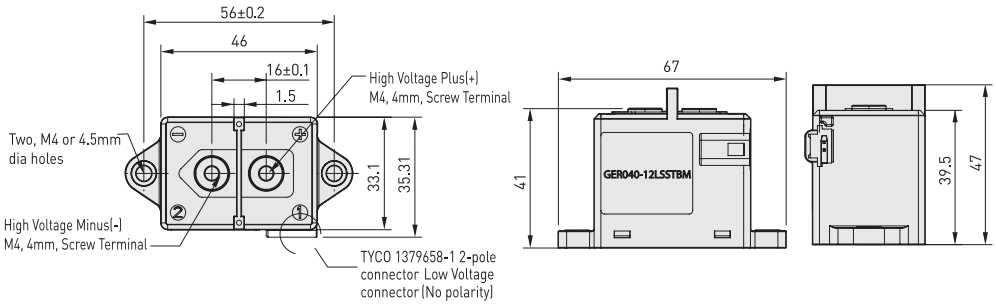
Note : I-T curve at ambient temperature of 23℃

GER 040

Connector Information

Housing : 1379658	Terminal : 1123343
 • Connector Style = Receptacle • Contact Type = Tab • Receptacle Configuration = 025	 • Contact Type = Receptacle • Applies To Wire/Cable • Wire/Cable Type = Discrete Wire • Wire Range = 0.20-0.60^2 [24-20] mm [AWG]

Dimensions

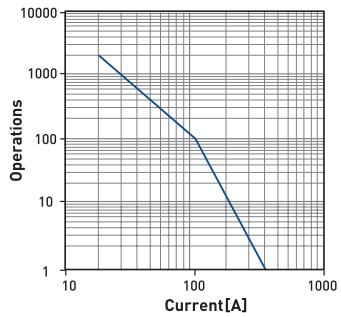


General Tolerance

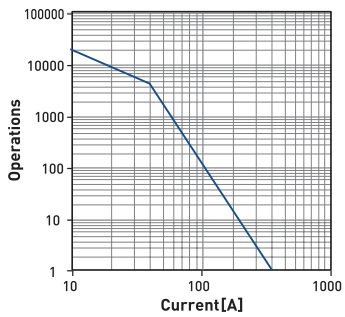
less than 10 : ±0.25
10~50 : ±0.5
more than 50 : ±0.8

Engineering Data

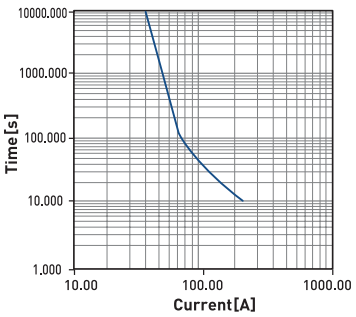
Cut-off life curve



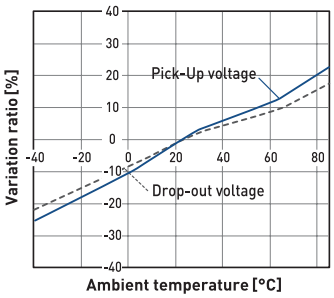
Switching life curve



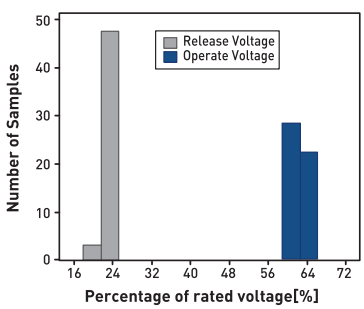
Current distribution



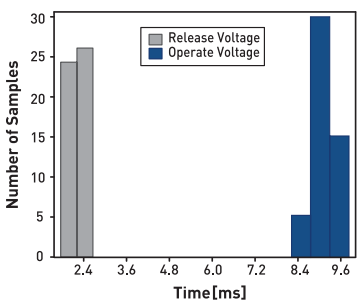
Ambient temperature characteristics



Low Voltage distribution



Time distribution

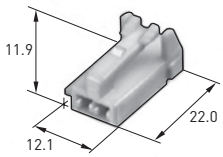


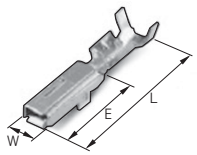
Note : I-T curve at ambient temperature of 23℃

GER 100

Connector Information

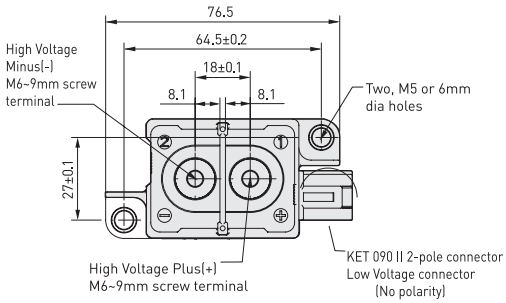
Housing:MG651026(L)	Terminal:ST730676-3

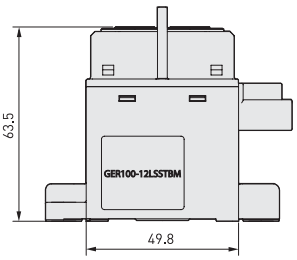


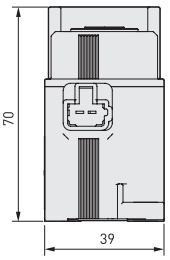


Part No.	Wire Range		Tab Thick	Material		Dimension(mm)		
	AWG	mm²		Thick	Finish	L	E	W
ST30676-3	18-16	AVSS (CAVS) 0.85~1.25	0.64	0.25	Copper Alloy Pre-Tin	18.0	9.0	2.9

Dimensions





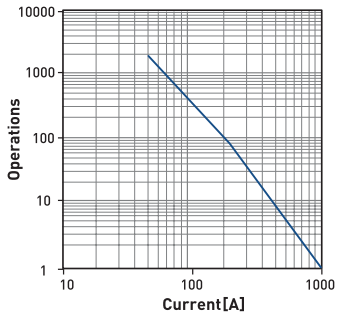


General Tolerance

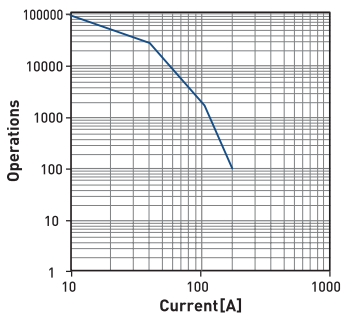
less than 10 : ±0.25
10~50 : ±0.5
more than 50 : ±0.8

Engineering Data

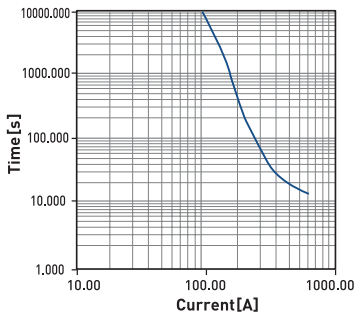
Cut-off life curve



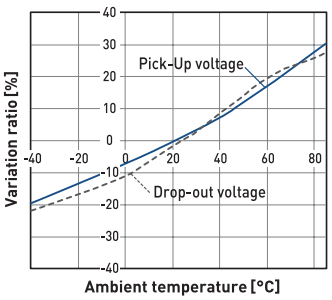
Switching life curve



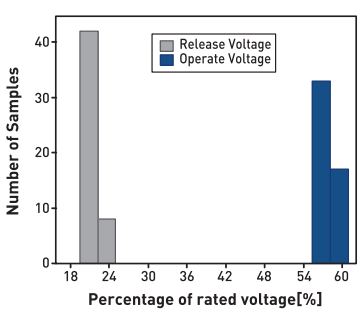
Current distribution



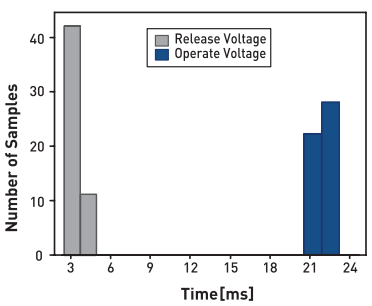
Ambient temperature characteristics



Low Voltage distribution



Time distribution

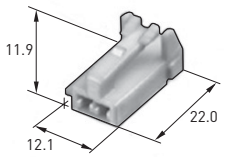


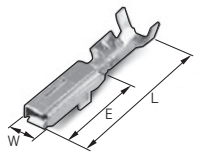
Note : I-T curve at ambient temperature of 23℃

GER 150

Connector Information

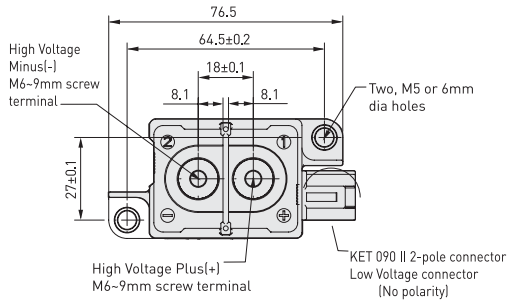
Housing:MG651026(L)	Terminal:ST730676-3

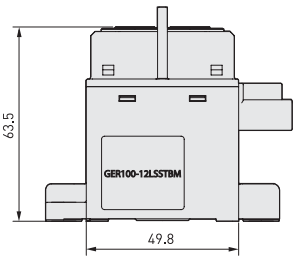


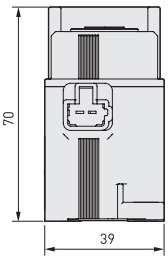


Part No.	Wire Range		Tab Thick	Material		Dimension(mm)		
	AWG	mm²		Thick	Finish	L	E	W
ST30676-3	18-16	AVSS (CAVS) 0.85~1.25	0.64	0.25	Copper Alloy Pre-Tin	18.0	9.0	2.9

Dimensions





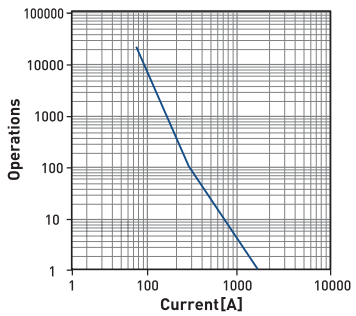


General Tolerance

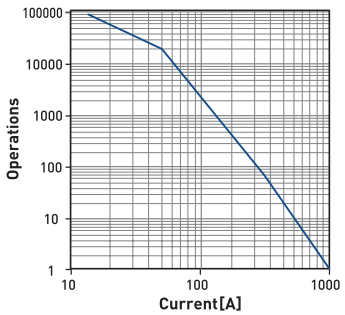
less than 10 : ±0.25
10~50 : ±0.5
more than 50 : ±0.8

Engineering Data

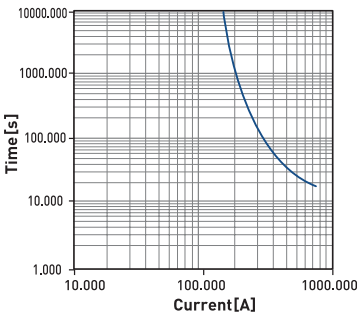
Cut-off life curve



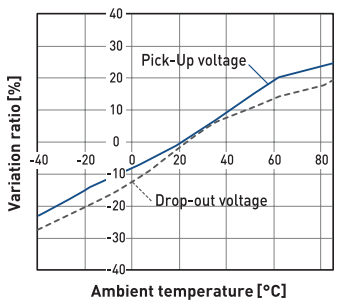
Switching life curve



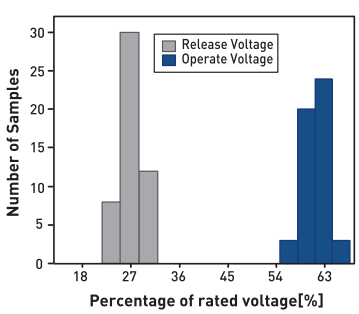
Current distribution



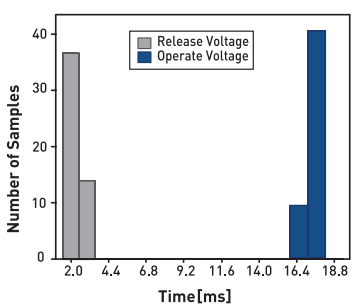
Ambient temperature characteristics



Low Voltage distribution



Time distribution

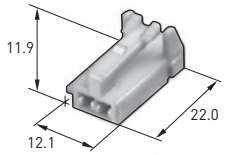


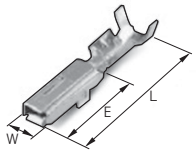
Note : I-T curve at ambient temperature of 23℃

GER 250

Connector Information

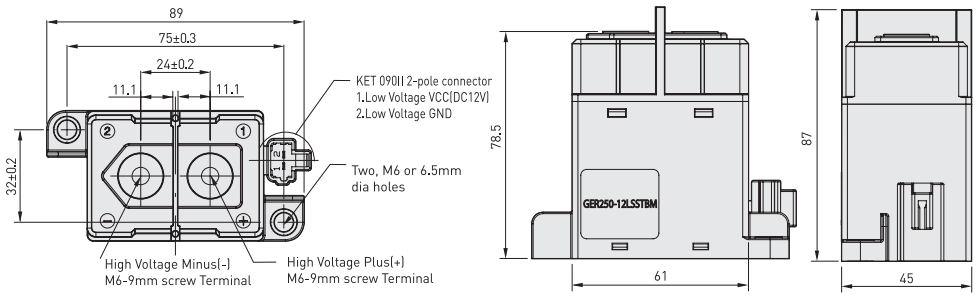
Housing:MG651026(L)	Terminal:ST730676-3





Part No.	Wire Range		Tab Thick	Material		Dimension(mm)		
	AWG	mm²		Thick	Finish	L	E	W
ST30676-3	18-16	AVSS (CAVS) 0.85~1.25	0.64	0.25	Copper Alloy Pre-Tin	18.0	9.0	2.9

Dimensions

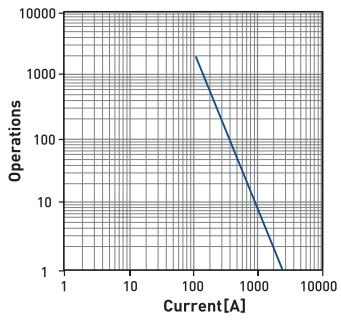


General Tolerance

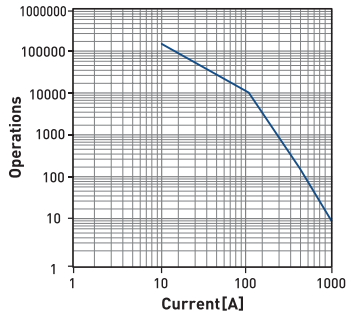
less than 10 : ±0.25
10~50 : ±0.5
more than 50 : ±0.8

Engineering Data

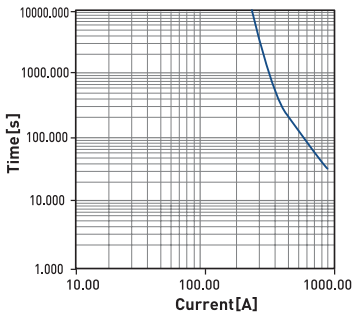
Cut-off life curve



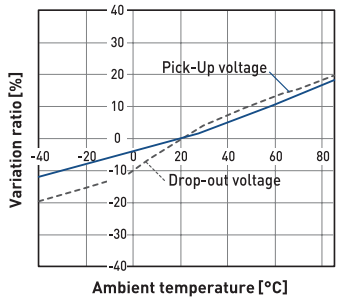
Switching life curve



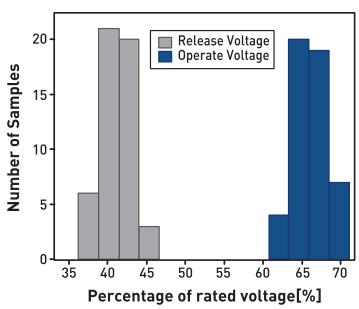
Current distribution



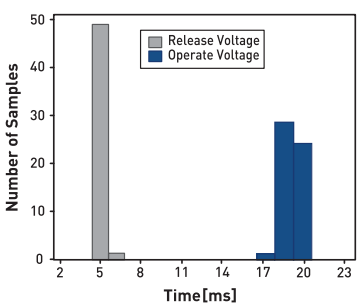
Ambient temperature characteristics



Low Voltage distribution



Time distribution

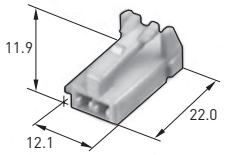


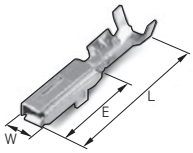
Note : I-T curve at ambient temperature of 23℃

GER 400

Connector Information

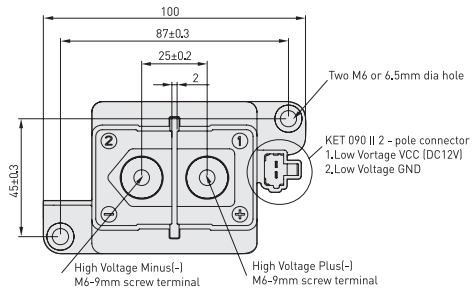
Housing:MG651026(L)	Terminal:ST730676-3

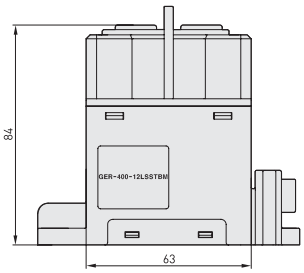


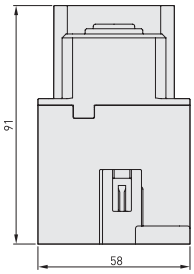


Part No.	Wire Range		Tab Thick	Material		Dimension(mm)		
	AWG	mm²		Thick	Finish	L	E	W
ST30676-3	18-16	AVSS (CAVS) 0.85~1.25	0.64	0.25	Copper Alloy Pre-Tin	18.0	9.0	2.9

Dimensions





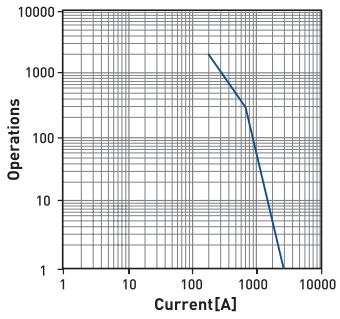


General Tolerance

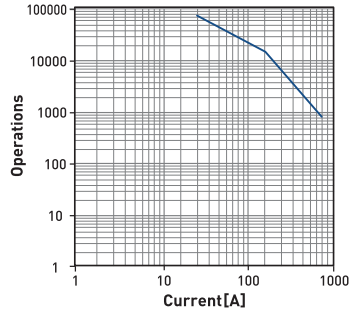
less than 10 : ±0.25
10~50 : ±0.5
more than 50 : ±0.8

Engineering Data

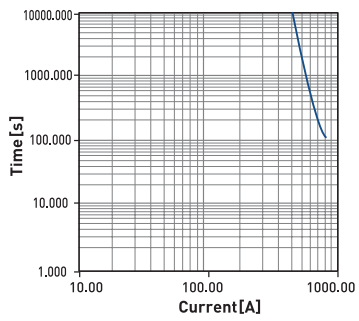
Cut-off life curve



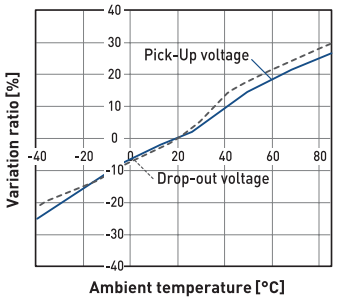
Switching life curve



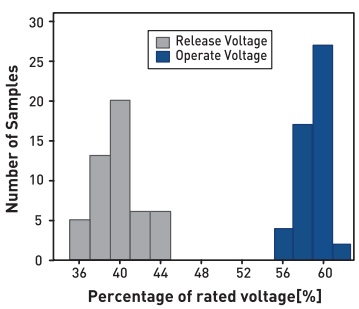
Current distribution



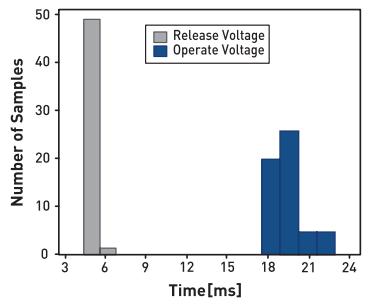
Ambient temperature characteristics



Low Voltage distribution



Time distribution



Note : I-T curve at ambient temperature of 23℃

Green Innovators of Innovation

Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance.
  Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

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Specifications in this catalog are subject to change without notice due to continuous product development and improvement.

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