TELEDYNE RELAYS
A Teledyne Technologies Company

NEW Series SHDC

Output to 60A, 200 Vdc
High Industrial Performance (HIPpak) DC Solid-State Relays

FEATURES/BENEFITS
- Latest generation MOSFET technology
- Ultra low on-state resistance
- Low output leakage current
- Built-in overvoltage protection
- Reverse protected triggered control input to avoid linear control risks
- No radiated or conducted disturbances
- IP20 touch-proof flaps


IP20 touch-proof flaps

Part Number	Description
SH10DC40	40A, 100 Vdc Solid-State Relay
SH10DC40-16	40A, 60 Vdc Solid-State Relay
SH20DC20-16	20A, 200 Vdc Solid-State Relay
SH20DC40-16	40A, 200 Vdc Solid-State Relay
SH75DC60-16	60A, 75 Vdc Solid-State Relay

Part Number Explanation

SH	10	DC	40	-16
Series	Line Voltage[1]	Switch Type[2]	Output Current – Amps	Option[3]

NOTES
1) Line Voltage (peak): 10 = 100 Vdc
2) Switch Type: DC = DC
3) Option: Internal Voltage Protection

ELECTRICAL SPECIFICATIONS
(+25°C ambient temperature unless otherwise specified)

INPUT (CONTROL) SPECIFICATIONS

	Min	Max	Units
Control Range	3.5	32	Vdc
Must Turn-Off Voltage	1		Vdc
Reverse Voltage		32	Vdc

CONTROL CHARACTERISTIC

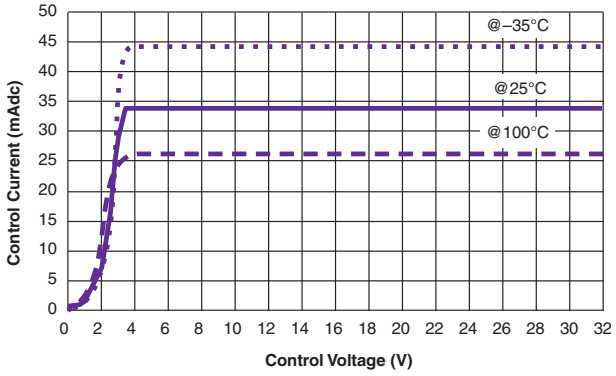
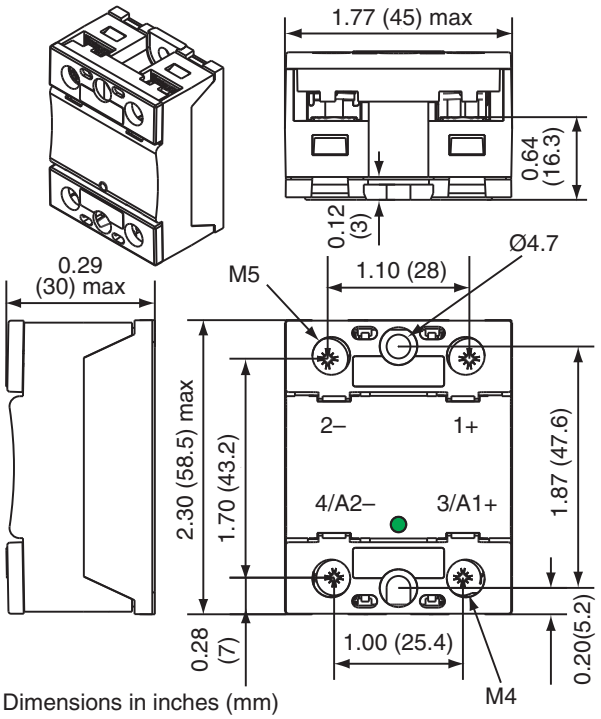


Figure 2

MECHANICAL SPECIFICATION



Dimensions in inches (mm)
Weight: 2.82 oz. (80g)

Figure 1

BLOCK DIAGRAM

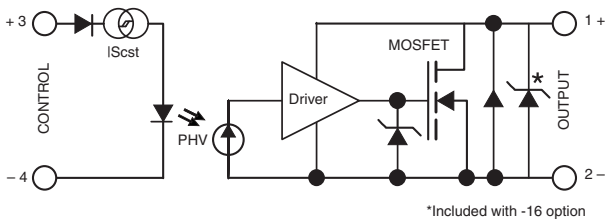


Figure 3

ELECTRICAL SPECIFICATIONS
(+25°C ambient temperature unless otherwise specified)

OUTPUT (LOAD) SPECIFICATIONS

	Min	Max	Units
Operating Range			
SH10DC40	5	100	Vdc
SH10DC40-16	5	60	Vdc
SH20DC20-16	5	110	Vdc
SH20DC40-16	5	110	Vdc
SH75DC60-16	5	40	Vdc
Peak Voltage			
SH10DC40		100	Vdc
SH10DC40-16		100	Vdc
SH20DC20-16		200	Vdc
SH20DC40-16		200	Vdc
SH75DC60-16		75	Vdc
Overvoltage Protection (Built-In)			
SH10DC40-16		56V (TVS)[1]	
SH20DCXX-16		75V (MOV Size 20)[2]	
SH75DC60-16		39V (TVS)[1]	
1) Transient Voltage Supressor; 2) Metal Oxide Varistor			
Reverse Voltage Drop			
SH10DC40-16		1.3	V
SH20DCXX-16		1.5	V
SH75DC60-16		0.92	V
Nominal Current (Resistive)			
SH10		40	A
SH20DC20-16		20	A
SH20DC40-16		40	A
SH75DC60-16		60	A
Non-Repetitive Peak Overload Current			
SH10		320	A
SH20DC20-16		160	A
SH20DC40-16		380	A
SH75DC60-16		750	A
Leakage Current		3	mA
On-State Resistance (@ 25°C)			
	@25 °C	@125 °C	
SH10	15	30	mΩ
SH20DC20-16	45	90	mΩ
SH20DC40-16	23	46	mΩ
SH75DC60-16	4.5	8.2	mΩ

ELECTRICAL SPECIFICATIONS (continued)
(+25°C ambient temperature unless otherwise specified)

OUTPUT (LOAD) SPECIFICATIONS

	Min	Max	Units
Output Capacitance (Typical)			
SH10	0.7		nF
SH20DC20-16	0.6		nF
SH20DC40-16	1.1		nF
SH75DC60-16	1.5		nF
Junction-Case Thermal Resistance			
SH10		0.9	°C/W
SH20DC20-16		1.2	°C/W
SH20DC40-16		0.7	°C/W
SH75DC60-16		1.2	°C/W
Built-In Heat Sink Thermal Resistance (Vertically Mounted)		10	°C/W
Heat Sink Thermal Time Constant		10	min
Control Inputs/Power Outputs Insulation Voltage		2.5	kV
Turn-On Time		20	µs
Turn-On Delay		20	µs
Turn-Off Time		20	µs
Turn-Off Delay		20	µs
On-Off Frequency		1000*	Hz

*For high frequency, take two times the load current to calculate the heat sink.

TIME DIAGRAMS

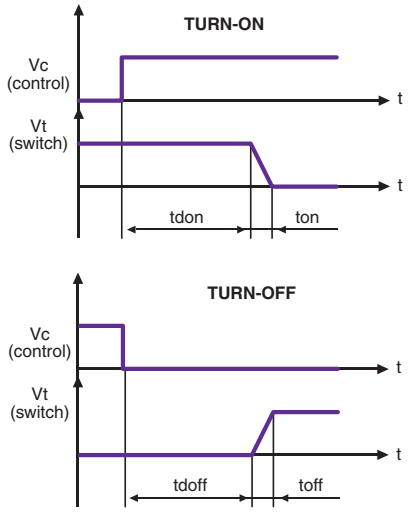
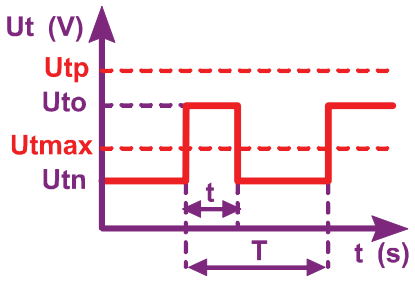


Figure 4

BUILT IN OVERVOLTAGE PROTECTION CHARACTERISTICS



$$\mathbf{Uto < Utp}$$

$$\mathbf{t\,max} = \frac{0.75}{\mathbf{(Uto - Ut\,max)} \times \mathbf{Ie}}$$

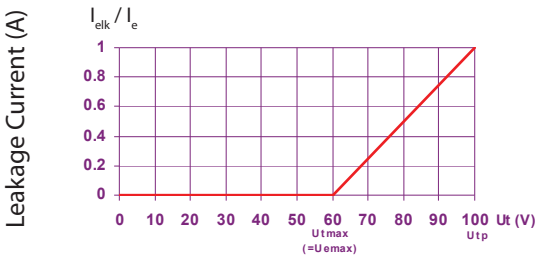
$$\mathbf{P_{(protection)} = 1W_{\,max}}$$

$$\Rightarrow \frac{\mathbf{(Uto - Ut\,max)} \times \mathbf{Ie} \times \mathbf{t}}{\mathbf{T}} \leq 1$$

I_{elk} : Leakage current of relay
I_e : User load nominal current
U_{tp} : Relay max. non repetitive peak voltage
U_{tmax} : Max. nominal voltage of relay

U_{to} : Possible overvoltage above U_{tmax}
U_{tn} : User power supply voltage
t : Overvoltage duration
T : Time between 2 overvoltages

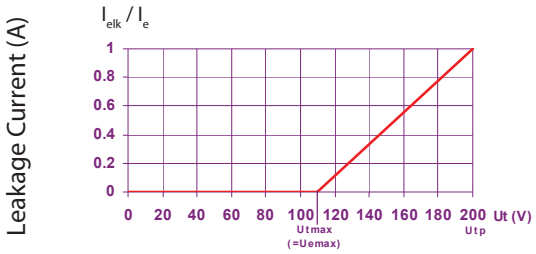
SH10DC40-16



Voltage (Vdc)

Figure 5a

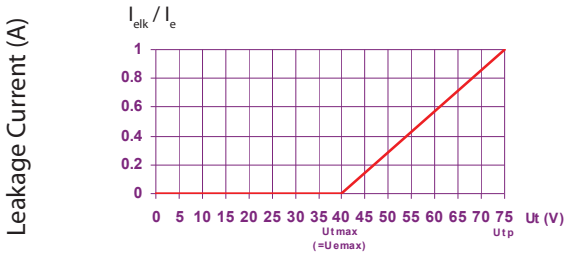
SH20DC20-16 & SH20DC40-16



Voltage (Vdc)

Figure 5b

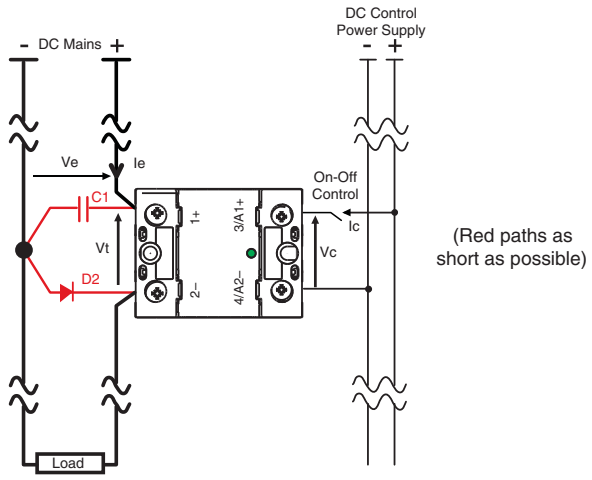
SH75DC-16



Voltage (Vdc)

Figure 5c

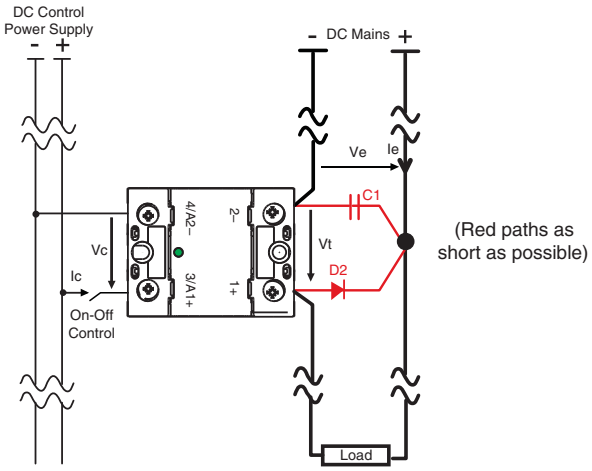
HIGH SIDE WIRING DIAGRAM
(Load Connected to "—")



(Red paths as short as possible)

Figure 6a

LOW SIDE WIRING DIAGRAM
(Load Connected to "+")



(Red paths as short as possible)

Figure 6b

GENERAL SPECIFICATIONS
(+25°C ambient temperature unless otherwise specified)

ENVIRONMENTAL SPECIFICATIONS

	Min	Max	Units
Operating Temperature	–25	+90	°C
Storage Temperature	–40	+100	°C
Input-Output Isolation		2.5	kV
Insulation Resistance	1		GΩ
Insulation Capacitance	8		pF
Junction Temperature			
Steady State		125	°C
Transient		175	°C
Case Temperature		100	°C

CONNECTIONS

	Power	Control
Screwdriver	POZIDRIV2	
Tightening Torque	2 N.m	1.2 N.m
Insulated crimp terminals (Round Tabs, Eyelet Type)	M5	M4

MISCELLANEOUS

Display	Green LED (ON)
Housing	UL94V0
Mounting	2 screws (M4x12mm)
Noise Level	No audible noise

GENERAL

Standards	IEC60947-1
Protection Level	IP20
Protection Against Direct Touch	Yes
CE Marking	Yes

E.M.C. EMISSION

Radiated & Conducted DisturbancesPending

ACCESSORIES

Faston: Contact Factory

NOTES
1. For additional/custom options, contact factory.

OUTPUT RELAY CHARACTERISTIC CURVES FOR SH10DC40 & SH10DC40-16

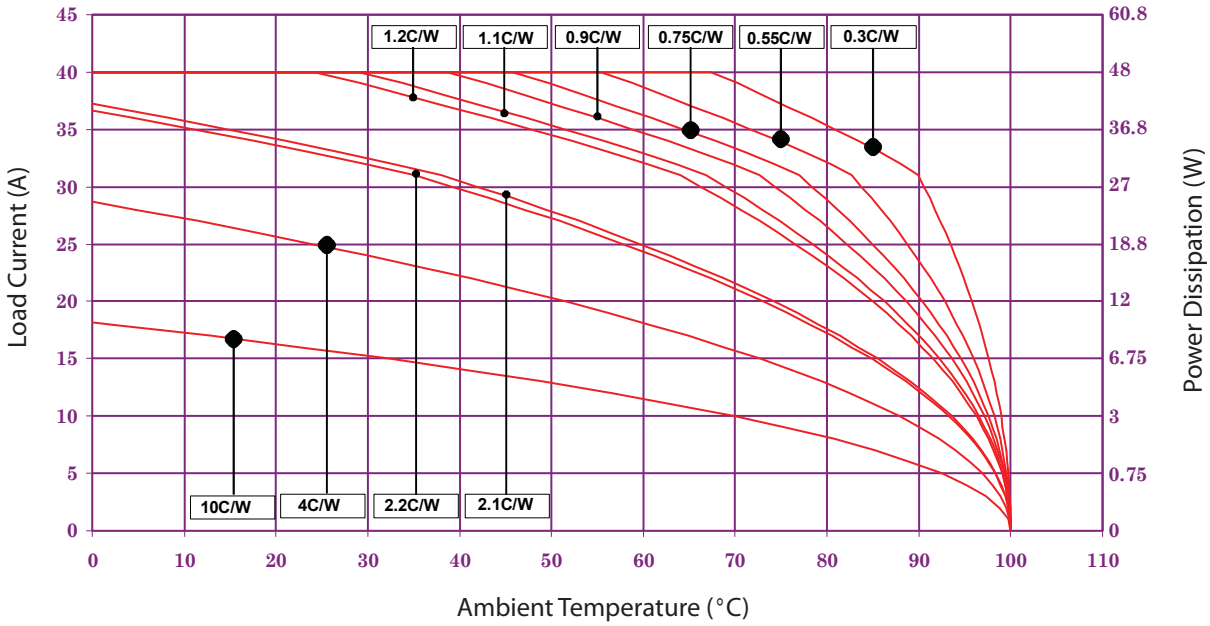
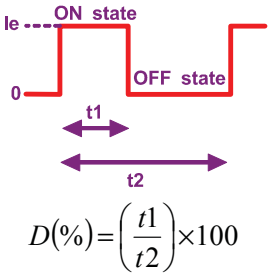


Figure 7a



$$D(\%) = \left(\frac{t1}{t2}\right) \times 100$$

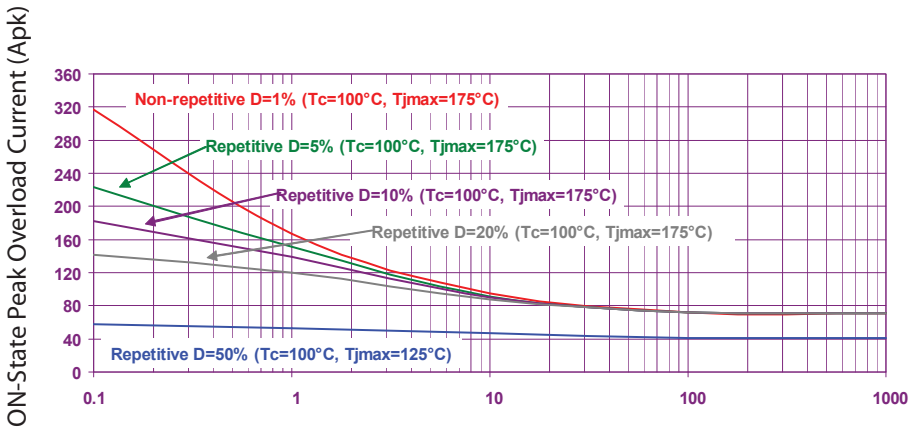


Figure 7b

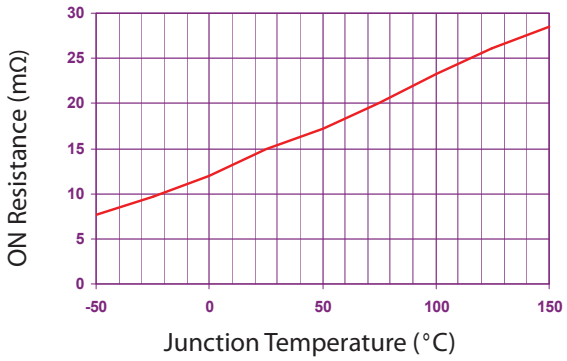
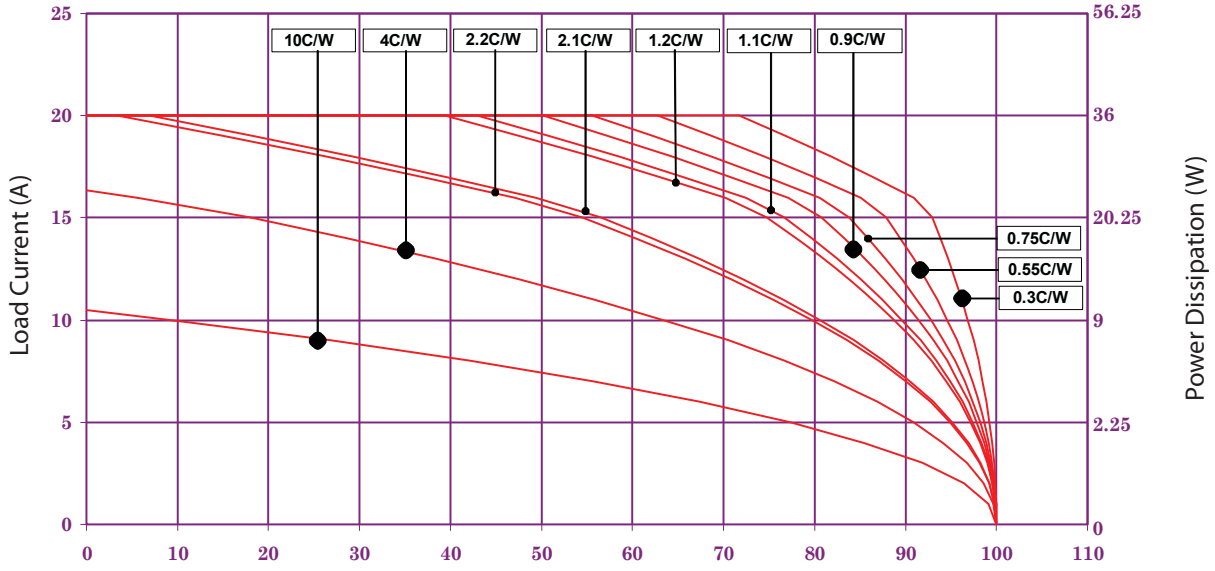


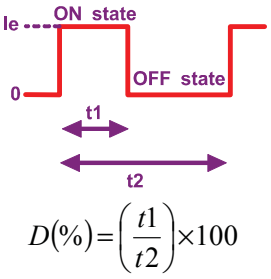
Figure 7c

OUTPUT RELAY CHARACTERISTIC CURVES FOR SH20DC20-16

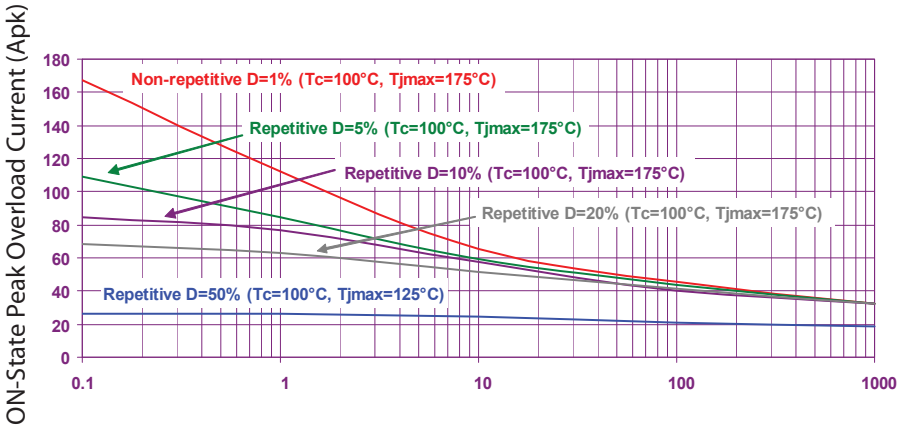


Ambient Temperature (°C)

Figure 8a

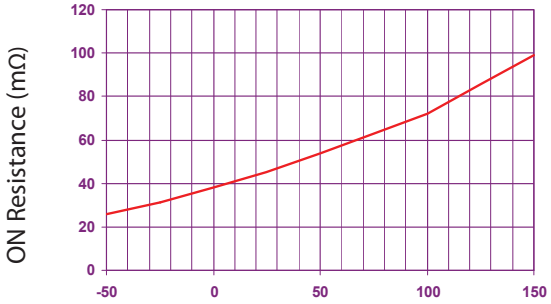


$$D(\%) = \left(\frac{t1}{t2}\right) \times 100$$



Pulse Duration (S)

Figure 8b



Junction Temperature (°C)

Figure 8c

OUTPUT RELAY CHARACTERISTIC CURVES FOR SH20DC40-16

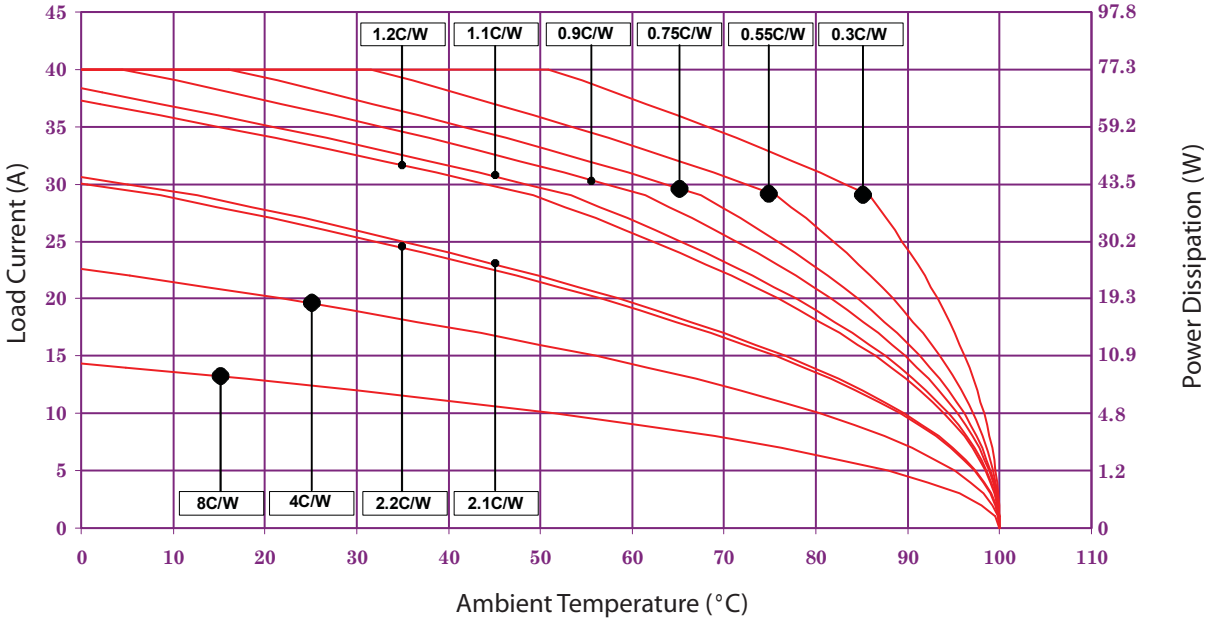
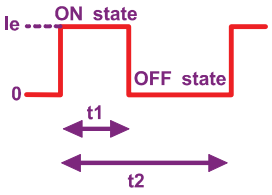


Figure 9a



$$D(\%) = \left(\frac{t1}{t2}\right) \times 100$$

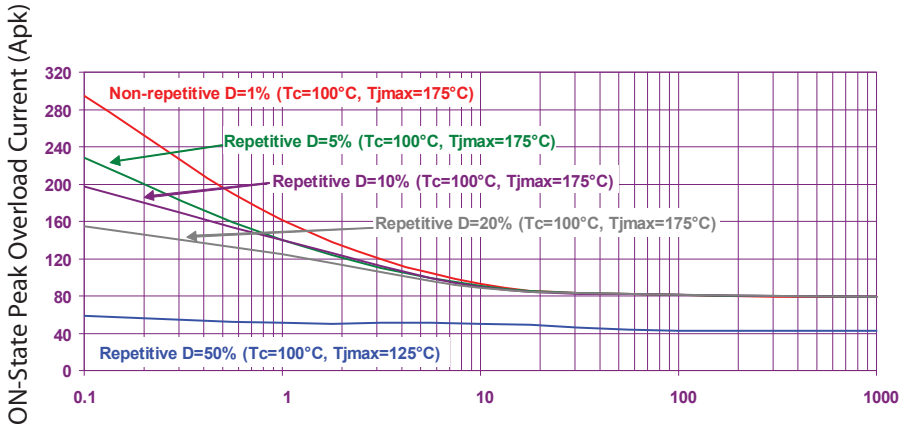


Figure 9b

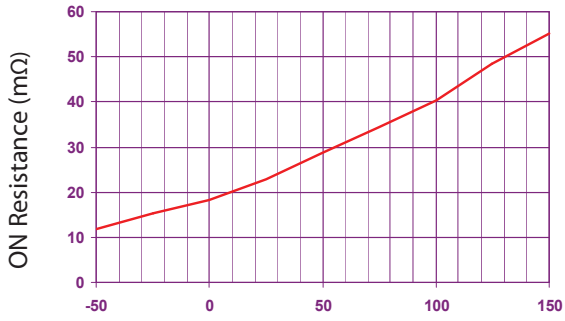


Figure 9c

OUTPUT RELAY CHARACTERISTIC CURVES FOR SH75DC60-16

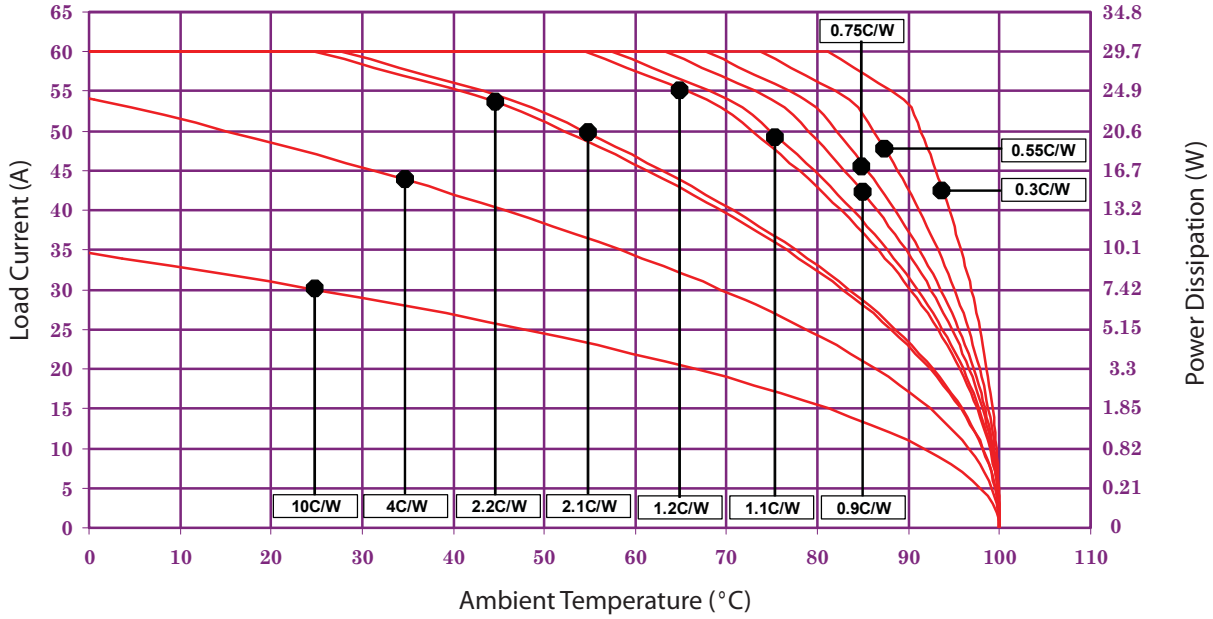


Figure 10a

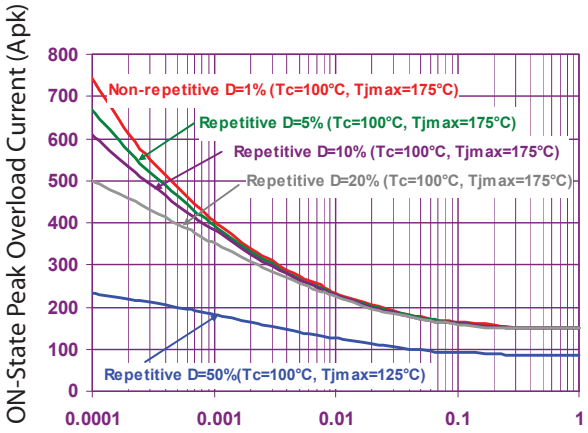


Figure 10b

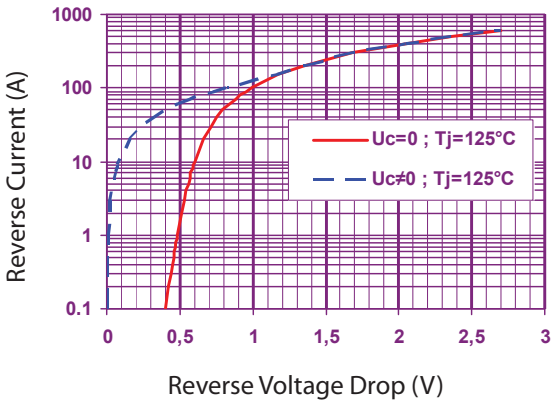


Figure 10c

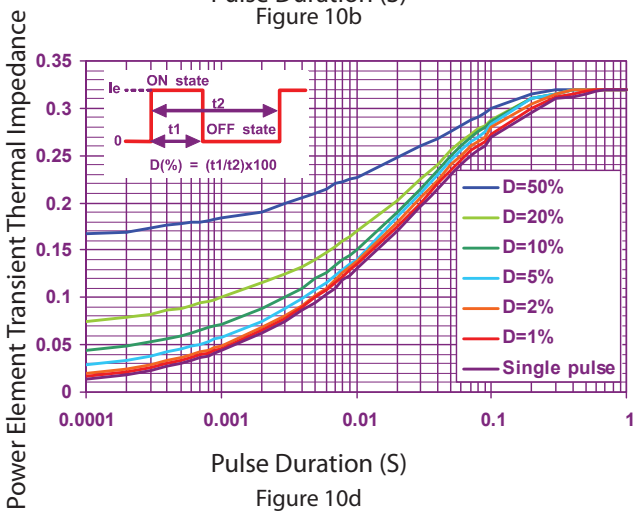


Figure 10d

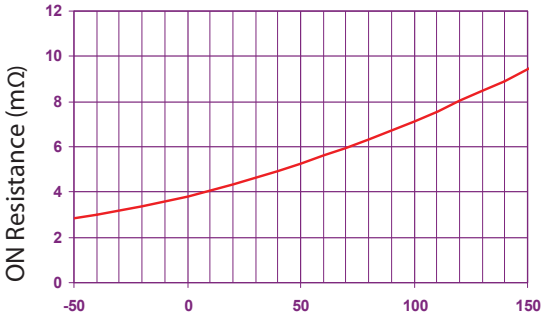


Figure 10e