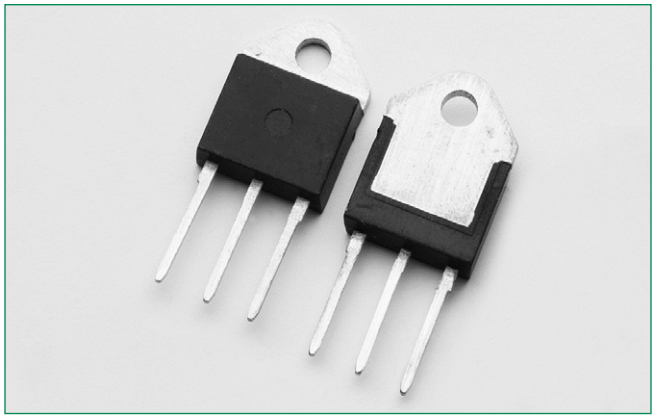
Thyristors
55 Amp Standard SCRs

SK655KD



Description

Excellent unidirectional switches for phase control applications such as heating and motor speed controls.

Standard phase control SCRs are triggered with few milliamperes of current at less than 1.5V potential.

Features & Benefits

- RoHS compliant
- Voltage capability up to 1600 V
- Surge capability up to 520 A
- Electrically isolated package "KD-Package" and UL Recognized for 2500V_{RMS}
- UL Recognized as an Electrically Isolated Semiconductor Device to UL 1557.

Agency Recognitions

Agency	Agency File Number
	E71639

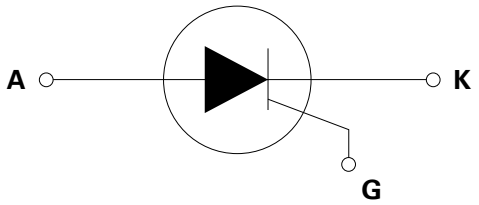
Applications

Typical applications are AC solid-state switches, industrial power tools and line rectification 50/60Hz.

Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	55	A
V_{DRM}/V_{RRM}	1600	V
I_{GT}	70	mA

Schematic Symbol



Absolute Maximum Ratings

Symbol	Parameter	Test Conditions	Value	Unit
V_{DRM}/V_{RRM}	Repetitive Peak off-state/Reverse Voltage		1600	V
V_{DSM}/V_{RSM}	Non-repetitive peak off-state/Reverse voltage		1700	V
$I_{T(RMS)}$	RMS on-state current	T_C = 55°C	55	A
$I_{T(AV)}$	Average on-state current	T_C = 55°C	35	A
I_{TSM}	Peak non-repetitive surge current	single half cycle; f = 50Hz; T_J (initial) = 25°C	550	A
		single half cycle; f = 60Hz; T_J (initial) = 25°C	660	
I^2t	I^2t Value for fusing	t_p = 8.3 ms	1800	A^2s
di/dt	Critical rate of rise of on-state current		150	A/µs
I_{GM}	Peak gate current	T_J = 125°C	3	A
$P_{G(AV)}$	Average gate power dissipation	T_J = 125°C	1	W
T_{stg}	Storage temperature range		-40 to 150	°C
T_J	Operating junction temperature range		-40 to 125	°C

Revised: 08/13/20

Electrical Characteristics (T_J = 25°C, unless otherwise specified)

Symbol	Test Conditions		Value	Unit
I_{GT}	V_D = 12V; R_L = 30 Ω	MAX.	70	mA
V_{GT}		MAX.	1.5	V
dv/dt	V_D = 2/3 V_{DRM}; gate open; T_J = 125°C	MIN.	2000	V/µs
V_{GD}	V_D = V_{DRM}; R_L = 3.3 kΩ; T_J = 125°C	MIN.	0.2	V
I_H	I_T = 500mA (initial)	MAX.	200	mA
t_q	I_T=0.5A; t_p=50µs; dv/dt=5V/µs; di/dt=-30A/µs	TYP.	20	µs
t_{gt}	I_G = 2 x I_{GT}; PW = 15µs; I_T = 110A	TYP.	5	µs

Static Characteristics

Symbol	Test Conditions			Value	Unit
V_{TM}	I_T = 110A; t_p = 380µs		MAX.	1.8	V
I_{DRM} / I_{RRM}	V_{DRM} / V_{RRM}	T_J = 25°C	MAX.	10	µA
		T_J = 125°C		8	mA

Thermal Resistances

Symbol	Parameter	Value	Unit
$R_{\Theta(JC)}$	Junction to case (AC)	1.0	°C/W

Figure 1: Normalized DC Gate Trigger Current vs. Junction Temperature

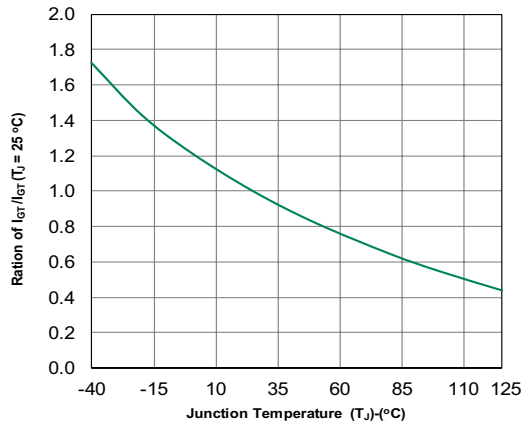


Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature

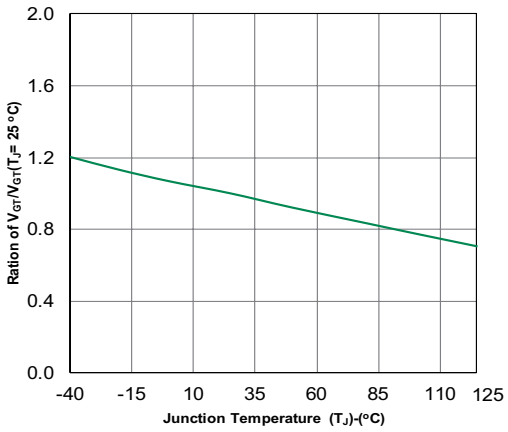


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Figure 3: Normalized DC Holding Current vs. Junction Temperature

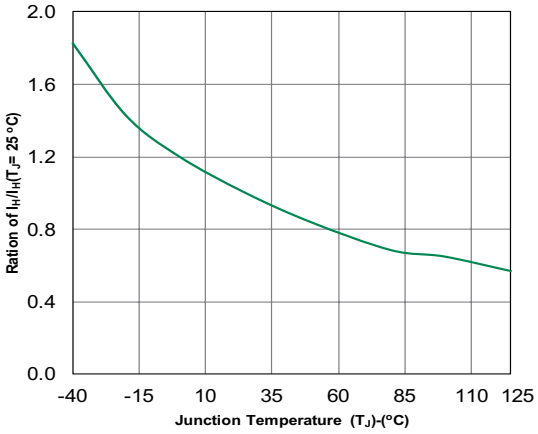


Figure 4: On-State Current vs. On-State Voltage (Typical)

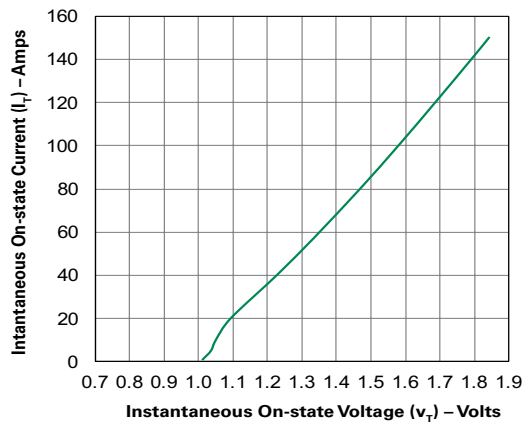


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

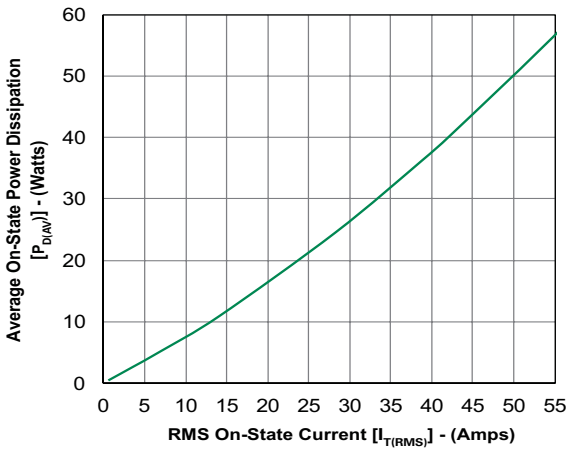


Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current

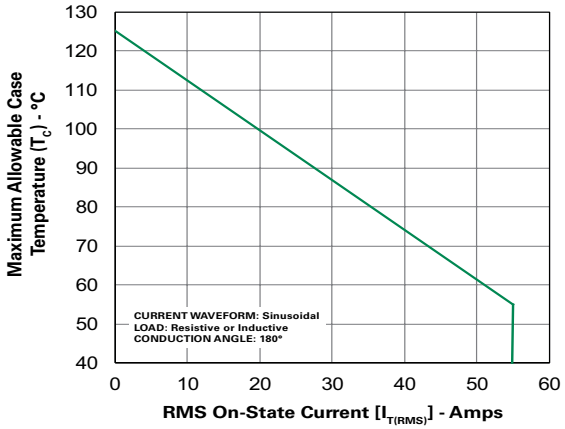


Figure 7: Maximum Allowable Case Temperature vs. Average On-State Current

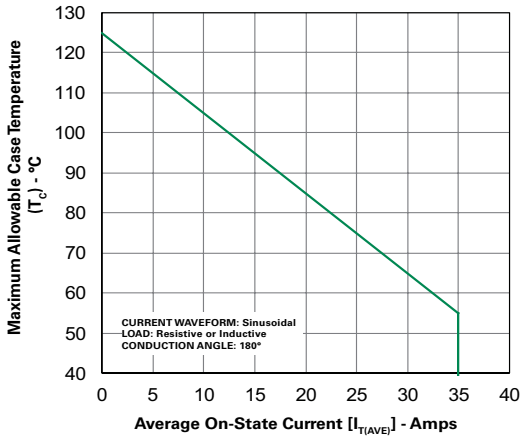
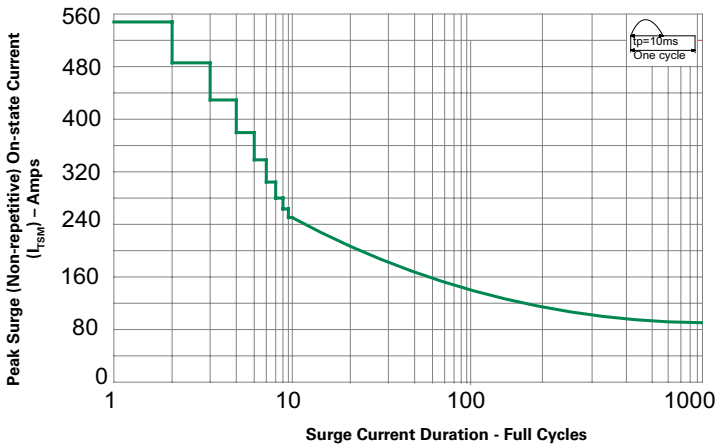


Figure 8: Surge Peak On-State Current vs. Number of Cycles



SUPPLY FREQUENCY: 50 Hz Sinusoidal
LOAD: Resistive
RMS On-State Current: [$I_{T(RMS)}$]: Maximum Rated Value at Specified Case Temperature

Notes:
1. Gate control may be lost during and immediately following surge current interval.
2. Overload may not be repeated until junction temperature has returned to steady-state rated value.

Design Considerations

Careful selection of the correct component for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Good design practice should limit the maximum continuous current through the main terminals to 75% of the component rating. Other ways to ensure long life for a power discrete semiconductor are proper heat sinking and selection of voltage ratings for worst case conditions. Overheating, overvoltage (including dv/dt), and surge currents are the main killers of semiconductors. Correct mounting, soldering, and forming of the leads also help protect against component damage.

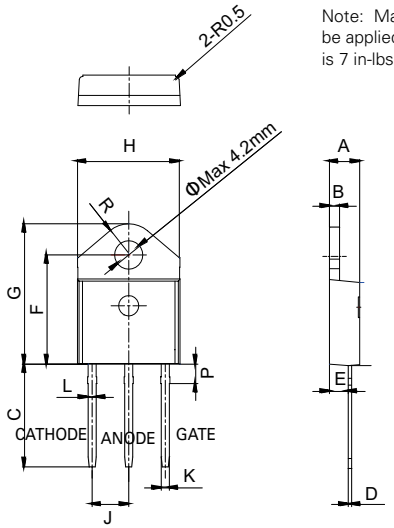
Environmental Specifications

Test	Specifications and Conditions
AC Blocking	JESD22-A108C, 80% V_{DRM} @125°C for 168 hours
Temperature Cycling	JESD22-A104D, M-1051, 50 cycles; -50°C to +150°C; 15-min dwell-time
Temperature/Humidity	EIA / JEDEC, JESD22-A101 168 hours; 100V - DC: 85°C; 85% rel humidity
Resistance to Solder Heat	JESD22-B106C
Solderability	ANSI/J-STD-002, category 3, Test A

Physical Specification

Terminal Finish	100% Matte Tin-Plated
Body Material	UL Recognized compound meeting flammability rating V-0

Dimensions – TO-218AC (KD Package) — Isolated Mounting Tab Common with Center Lead



Note: Maximum torque to be applied to mounting tab is 7 in-lbs. (0.8 Nm).

Dimension	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	1.45		1.55	0.057		0.061
C	14.35		15.60	0.565		0.614
D	0.50		0.70	0.020		0.028
E	2.70		2.90	0.106		0.114
F	15.80		16.50	0.622		0.650
G	20.40		21.10	0.803		0.831
H	15.10		15.50	0.594		0.610
J	5.40		5.65	0.213		0.222
K	1.10		1.40	0.043		0.055
L	1.35		1.50	0.053		0.059
P	2.80		3.00	0.110		0.118
R		4.35			0.171	

Revised: 08/13/20

Thyristors
55 Amp Standard SCRs

Product Selector

Part Number	Gate Sensitivity	Type	Package
SK655KD	70mA	Standard SCR	TO-218AC

Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
SK655KDTP	SK655KD	4.8g	Tube	3600 (30 per tube)

Part Numbering System

S K6 55 KD TP

Device Type
S: SCR

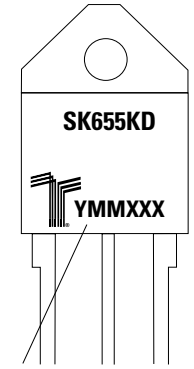
Voltage Rating
K2: 1200V
K6: 1600V

Current Rating
55: 55A

Package Type
KD: TO-218AC (isolated)

Packaging Type
TP: Tube Pack

Part Marking System



Date Code Marking
Y:Year Code
MM: Month Code
XXX: Lot Serial Code