Introduction to Thyristor Devices
Outline

- **SIDAC Applications**
  - Gas Ignition Applications
    - Operation - High Energy SIDAC
  - HID Lighting Applications
    - Operation – High Pressure Sodium (Std SIDAC)
    - Operation - Metal Halide (MP SIDAC)
- **SCR Applications**
  - Engine System Voltage Regulator
    - High Power SCR
  - Animal Control Fencer
- **AC Power Applications**
  - Triac Operation (Quadrants & Variants)
  - Triac Packages (High Temp)
  - Triac Circuits
    - Cascade Heater Control
    - Isolated Solid-State Relay
  - High Power 2 x SCR Operation (1.414 X Rating)
SIDAC Gas Ignition Applications
SIDAC Gas Ignition Circuit

Gas Igniter Control

Sidac for Gas Igniter Circuit

Littelfuse High Energy SIDAC devices offer solid-state performance and reliability at GDT energy levels:

- Precision Switching Voltage
- No Aging Effects
- Lower Power Dissipation

Littelfuse High Energy SIDAC

Nominal Switching Voltage

Packaging:
- E=TO-92
- G=DO-15
- S=SMB
SIDAC HID Lighting Applications
SIDAC HID Lighting Ignition
High Pressure Sodium Lighting – Standard SIDAC

SIDAC = Voltage Controlled Switch

SIDAC

Nominal Switching Voltage

K2200E

Standard SIDAC

Package
E=TO-92
G=DO-15
S=SMB

Std SIDAC Starter Circuit Must Produce 1500V Pulse Every AC Half Cycle to Strike HPS Lamp
SIDAC HID Lighting Ignition
Metal Halide Lighting – Multi-Pulse SIDAC

The Multi-Pulse SIDAC Starter Circuit Must Produce Three 4000V Pulses Every AC Half Cycle to Strike Metal Halide Lamp

SIDAC Nominal Switching Voltage

Lamp

Ballast

Igniter unit

Special Note:
For Combination Starters Multi-Pulse SIDACs may also be used in High Pressure Sodium Applications
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SCR Applications

Engine System Voltage Regulator

- Non-Automotive Gasoline or Diesel Engines > 500cc
SCR = Silicon Controlled Rectifier

1. Blocks all current when off.
2. Conducts forward current when turned on by injecting gate current.
3. Never conducts reverse current.

**Part Number Breakdown**

- **SCR**: S6055R
- **Voltage Rating**: ÷10
- **Current Rating**

**Package**

- **K**: TO-218AC (Isolated)
- **M**: TO-218AC
- **J**: TO-218X (Isolated)
- **W**: TO-218X
- **R**: TO-220
- **N**: D² Pak
SCR High Voltage Supply
Animal Control Fencer

Features & Benefits
- Efficient HV pulsing supply
- Reliable solid-state components
- Easy method to control energy output by capacitor selection
- High dv/dt capability for noise immunity
- Wide range of SCR ratings and packages
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AC Power Applications

- Electric Heaters
- Machine Tools
- Water Heaters
- Compressors
- Industrial Battery Chargers
- Welders
Triac Operation

**Triac**
- Solid-state On/Off Control
- Variable Power Control (Phase Control)
- Use on Resistive Loads (Heaters, Lights, etc.)
- Available to 125°C

**Alternistor Triac**
- Triac Variant
- Excellent Commutating
- No Quadrant IV Operation
- Use on Inductive Loads (Motors, Coils, etc.)
- Available to 150°C

Notice: Triacs operation use only two quadrants
Triac Part Numbers and Packages

Triac Part Numbering

Q: Triac or Alternistor
HQ: 150°C Alternistor

DEVICE TYPE

VOLTAGE RATING
40: 400V
60: 600V
80: 800V
K0: 1000V

CURRENT RATING
15: 15A
16: 16A
25: 25A
30: 30A
35: 35A
40: 40A

TO-220AB
TO-218AC
TO-218X
TO-263

Fastpak

SENSITIVITY
Standard Triac
5: 50mA
Alternistor
H5: 50mA
6: 80mA
H6: 80mA
7: 100mA

PACKAGE TYPE
L : TO-220AB Isolated
R : TO-220AB Non-Isolated
N : TO-263 (D² -Pak)
K : TO-218AC Isolated
J : TO-218X Isolated
P : Fastpak
Power Triac Driven by Low Current Triac in Heater Control Circuit

Features & Benefits
- Q1 operates in quadrants 1 and 4
- Q2 operates in quadrants 1 and 3
- All Solid-State
- PIC Micro Processor controlled (see App Note AN1003 for more details)

Design Constraints
- Controller ground is the AC power neutral line.
- Controller can only output positive signals.
Isolated Solid State Switch or Relay Control Circuit

Features & Benefits

- Power Triac driven by Opto Coupler
- Opto Coupler is isolated switch for AC line gate supply
- Power Triac operates in quadrants 1 and 3
- All Solid-State
- Opto Coupler can be random turn-on or zero crossing turn-on type (see App Note AN1007 for more details)
High Power Anti-Parallel SCR Circuit

Features & Benefits
- Low Part Count
- All Solid-State
- No Moving Parts
- Immune to Commutation Issues
- High Current Rating
- Possible Synchronized Soft Start

Current Rating = 1.4 x SCR Current Rating
(e.g. 70A SCR → 98A Current Rating)

240VAC

Motor Speed Control Circuit

Opto-Isolated Triac
Thank You!

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