

What is IGBT?

IGBT dimmers are an Insulated Gate Bipolar Transistor power device that works in tandem with a dedicated microprocessor to control almost any type of lighting load required.

IGBT dimmers are completely silicon-based and operate silently without the use of chokes, and do not produce any mechanical buzz or hum associated with Silicon Controlled Rectifiers or SCR dimmers. They are smaller, lighter, and generate fewer neutral harmonics than SCR dimmers.

Transition Time

IGBT dimmers operate up to 1,000 micro-second transition time (depends on dimmer model) and can sense and automatically respond to changes it detects in incoming power, load size, load type, load condition, and temperature. SCR chokes are tuned to a specific, set rise time at a specific load wattage and load type. And, SCR choke-based systems produce tremendous amounts of heat requiring external, often expensive cooling schemes. This means one IGBT dimming module can adapt its rise time for most efficient operation and reduced waste heat.

Voltage Drop

Voltage drop across an 800 micro-second rise time IGBT dimmer is less than 2.5 volts. Voltage drop across an 800 microsecond rise time SCR dimmer exceeds 7 volts. This means that SCR dimmers produce less light and more waste heat. Voltage drop through the IGBT dimmer itself is minimal. This means the lamps come up at the same time, to the same color temperature, and to the same intensity. The IGBT dimmer will then maintain the specified lamp color temperature.

Voltage Regulation

An IGBT dimmer actively regulates both the VOLTAGE and the CURRENT supplied to its load.

IGBT voltage regulation at 120 VAC is accurate to 0.5 volt (a swing of one volt). The best SCR dimmers regulate to 2.5 volts (a swing of 5 volts).

IGBT maximum output voltage is selectable, and has a default of 120 VAC. Choosing 115 VAC can extend lamp life even further. IGBT current regulation solves a problem called cold current inrush. Cold lamp filaments have low electrical resistance. Uncontrolled, a cold filament will pass roughly 15-20 times "normal" current. As the cold filament heats, resistance rises and the flow of current tapers off. Cold current inrush contributes to lamp failure. IGBT can extend lamp life by precisely controlling the amount of current supplied.

Cooling

IGBT dimmers use an extruded aluminum heatsink for waste heat dispersal, and are natural-convection cooled. Most IGBT dimmers need no cooling fans, unless placed in an enclosure. Each individual IGBT dimmer uses the microprocessor "intelligence" to monitor and manage operating temperature. SCR dimming uses forced air cooling and requires cooling fans. Most SCR dimming racks monitor the ambient temperature of the entire rack, and will shut down the entire rack upon reaching maximum temperature.

Distributed Dimming

Since IGBT dimmers are lightweight at less than 2 pounds per dimmer, more efficient at any load, create no mechanical buzz or hum, and use natural-convection cooling to produce less heat, they can be distributed adjacent to the required dimmed load. Distributed Dimming is the most cost effective way to equip a facility. Savings result from lower electrical installation costs, longer lamp life, and less wasted energy. Distributed dimming lowers electrical installation costs by requiring less wire, fewer terminations, the elimination of air-conditioned dimmer rooms, and noise-corrective acoustical treatments. Placing the dimmers at required loads allows for a completely flexible dimming system.

Distributed IGBT Dimming is available in all R21 Powered Raceway, S21 / S21 LED / eS21 / eS21 LED Dimmer Strips, and Light Pack individual dimmers.

Manual Dimmer Control

All IGBT dimmers incorporate a "focus" button feature which allows for manual operation of each dimmer, saving setup time and labor. Most SCR dimmers must be controlled through a central processor module or switched "on".

IGBT Dimming Technology Features*

- Fully Digital Dimming technology with Forward / Reverse phase dimming (automatic or user-selectable)
- Compatible with new LED drivers that require reverse phase operation
- No dimmer room required and no added cooling needed
- Energy efficient – only a 2.5 volt (or less) insertion loss (depends on model)
- Solid-state dimming technology with adjustable transition (rise) time up to 1,000 μ s for quiet operation
- Low Harm mode to reduce neutral harmonics
- Automatic Overload Short Circuit protection
- Products available for 120V, 277V, or 230V/240V applications

*Check specific model details for complete features.



Neutral Harmonics

All phase control dimming systems generate harmonic currents. Excess harmonic currents can overload neutral conductors and overheat service transformers. Excess harmonic currents also manifest themselves as noise. IGBT dimming features a patented LOW HARM operating mode that limits harmonic currents and reduces the noise produced by the dimming system.

IGBT Versus SCR Benefits

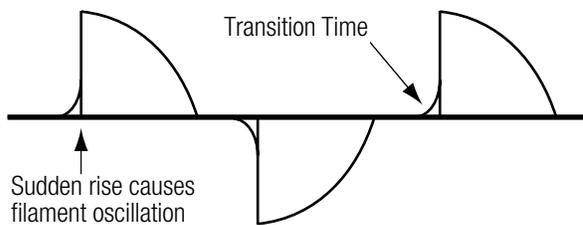
	Quiet	Efficient	Size/Weight	No RF Noise	Affordable
	✓	✓	✓	✓	✓
SCR	✗	✗	✗	✓	✓

Forward versus Reverse Phase Control

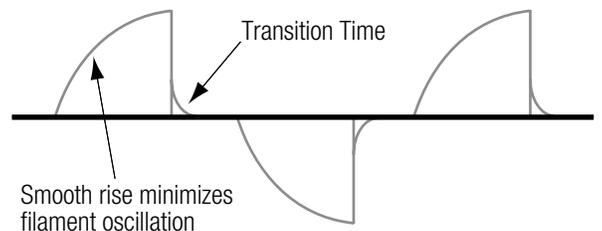
Below is a graphical representation of Forward and the benefits of Reverse Phase Control.

■ Reverse Phase Control
 ■ Forward Phase Control

FORWARD PHASE CONTROL (turns current on)



REVERSE PHASE CONTROL (turns current off)



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