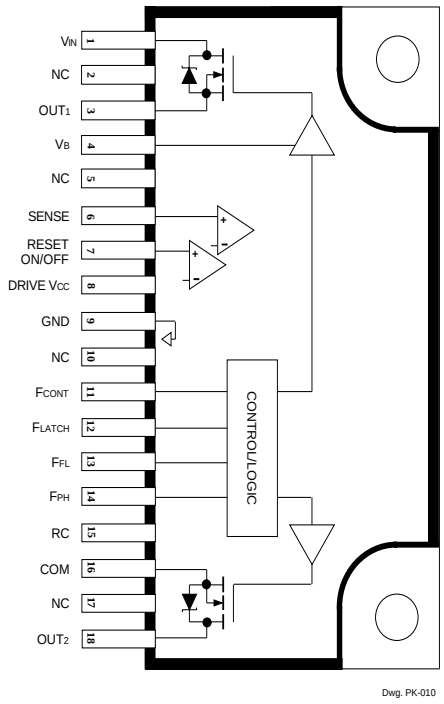
SERIES
STR-B5050

Data Sheet
28195

ADVANCE INFORMATION
(subject to change without notice)
March 10, 1999

FLUORESCENT-LAMP INVERTER BALLAST



Dwg. PK-010

ABSOLUTE MAXIMUM RATINGS

Output Voltage,
V_{OUT} . . . . . **See Specifications**
High-Side Gate Supply Voltage,
V_B . . . . . **8.5 V**
Control Supply Voltage, V_{CC} . . . . **36 V**
Package Power Dissipation,
P_D . . . . . **See Graph**
Junction Temperature, T_J . . . **+150°C**
Operating Temperature Range,
T_A . . . . . **-20°C to +125°C**
Storage Temperature Range,
T_{stg} . . . . . **-40°C to +150°C**

The Series STR-B5050 is a fully integrated solution for electronic fluorescent ballasts in commercial, industrial, and consumer applications. The nine devices in this series are identical except for output driver ratings (<72 W to 200 W).

Each device includes control circuitry, a high-voltage driver, and two power MOSFETs in a fully isolated, single in-line power-tab package. Built-in sequences are provided for pre-heat, strike, normal operation, dimming, and fault or end-of-life protection. Super-resonant operation (inductive/lagging power factor) is sustained in all operating modes. Auto restart, together with the full complement of protection functions, ensures reliable operation in demanding environments.

FEATURES

- 600 V BCD Monolithic Control/Half-Bridge Driver
- 3rd Generation High-Voltage Power MOSFETs
- Built-In Sequencing:
  Pre-Heat, Strike, Dimming, End-of-Life
- Auto Restart After Lamp Exchange
- Avalanche-Rated NMOS
- Low $r_{DS(on)}$ NMOS Outputs
- Improved Body Diodes
- ON/OFF and Reset Functions
- Regulated High-Side Driver
- Comprehensive Protection:
  Fault/End-of-Life or
  Sub-Resonant Operation
- Electrically Isolated Power Tab
- Machine-Insertable Package

Always order by complete part number: **STR-B5054** .

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SERIES STR-B5050
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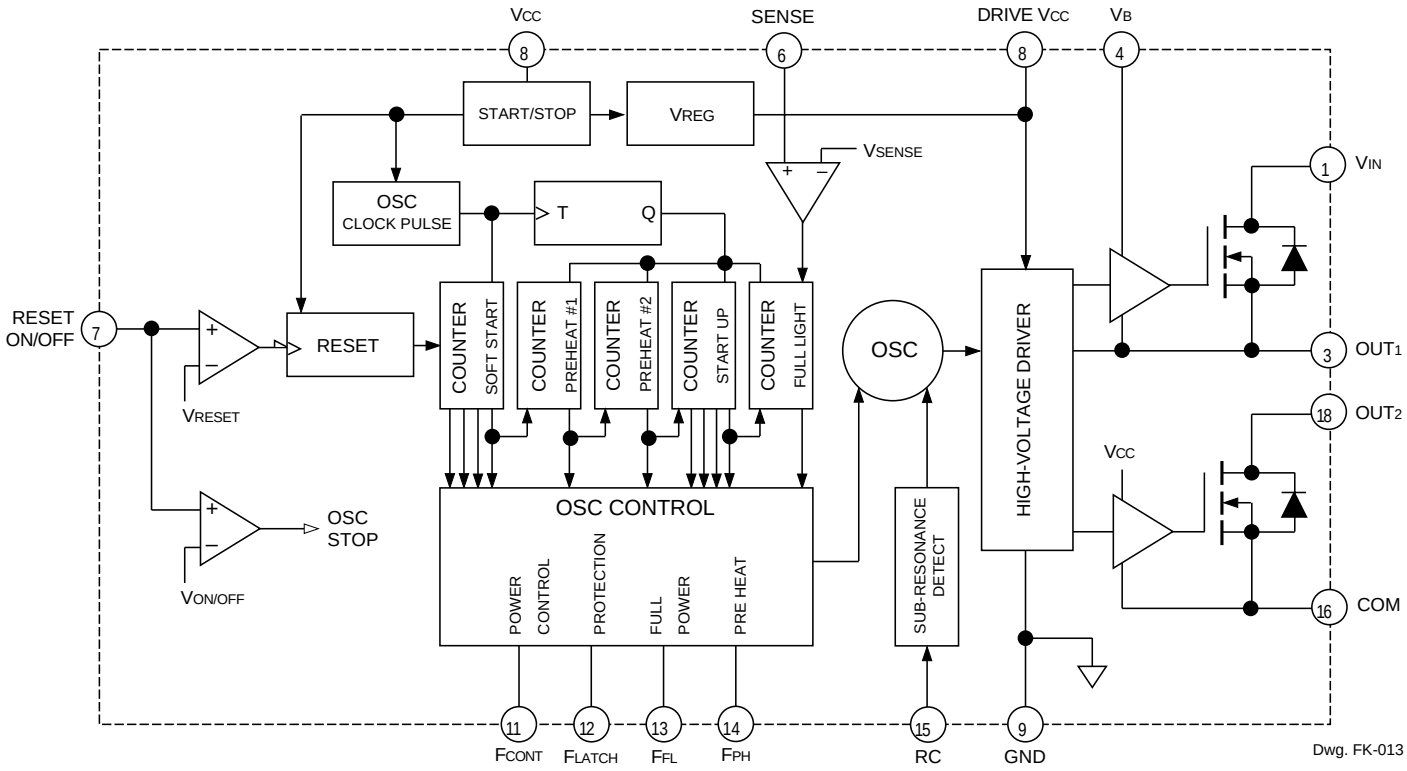
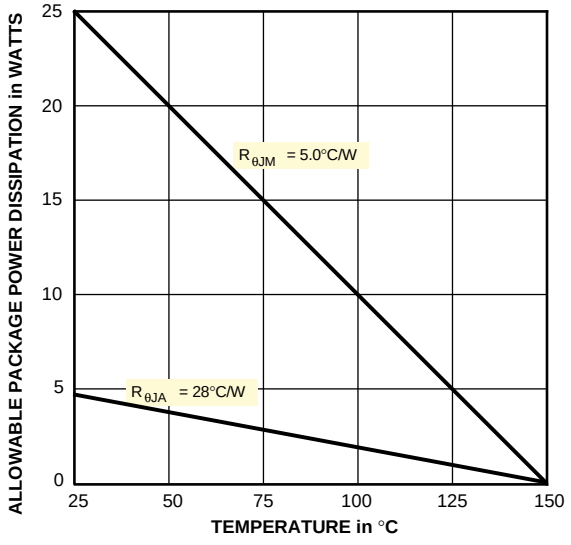
FUNCTIONAL BLOCK DIAGRAM



ALLOWABLE PACKAGE POWER DISSIPATION



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ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Remarks	Limits			
			Min	Typ	Max	Units
Controller						
Operation Start Voltage	$V_{CC(ON)}$		–	17	–	V
Operation Stop Voltage	$V_{CC(OFF)}$		–	9.0	–	V
Gate Drive Circuit Voltage	V_{DRI}		–	8.0	–	V
Range of Full Lighting Freq.	f_{FL}		0	50	70	kHz
Maximum Output Frequency	Δf_{MAX}	At soft-start state	–	80	–	kHz
Range of Preheating Freq.	Δf_{PH}	Adjustable by external resistor	–	–	–	kHz
Range of Dimming Freq.	Δf_{CONT}	Adjustable by external resistor	–	–	–	kHz
Range of Lamp Life Protection Frequency	Δf_{LATCH}	Adjustable by external resistor	–	–	–	kHz
Preheating Start Freq.	f_{SPH}	Proportion to preheating frequency	–	+15	–	%
Ignition Frequency	f_{IGN}	Proportion to preheating frequency	–	-15	–	%
Output Dead Time	t_d		–	1.2	–	µs
Soft Start Time	t_{ss}		–	15	–	ms
Filament Preheat Start Time	t_{SPH}		–	15	–	ms
Filament Preheating Time	t_{PH}	Soft start finish to ignition start	–	1.0	–	s
Ignition Time	t_{IGN}	Preheating finish to full lighting	–	1.0	–	s
Full Lighting Hold Time	t_{FL}	Full lighting at start to dimming	–	2.0	–	s
Deviated Resonant Mode Detec. Voltage	V_{RC}		–	±0.1	–	V
Lamp Life End Detection Volt.	V_{SENSE}		–	1.5	–	V
Reset Signal Input Voltage	V_{RESET}		–	2.0	–	V
ON/OFF Signal Input Volt.	$V_{ON/OFF}$		–	3.5	–	V
MOSFET Drivers						
Drain-Source Breakdown Volt.	$V_{(BR)DSS}$		See Table			V
Drain-Source ON Resist.	$r_{DS(on)}$		See Table			Ω

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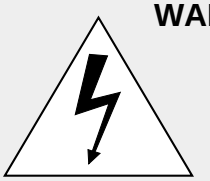
Part Number	Drain-Source Output Breakdown Voltage $V_{(BR)DSS}$, Minimum	Drain-Source ON Resistance $r_{DS(on)}$, Maximum	Output Power
For 100/120 V AC Input			
STR-B5051	450 V	0.61 Ω	102 W – 200 W
STR-B5052	450 V	0.95 Ω	72 W – 102 W
STR-B5053	450 V	1.41 Ω	Less than 72 W
For 110/120 V AC Input			
STR-B5054	500 V	0.72 Ω	102 W – 200 W
STR-B5055	500 V	1.12 Ω	72 W – 102 W
STR-B5056	500 V	1.67 Ω	Less than 72 W
For 230 V AC Input			
STR-B5057	600 V	1.02 Ω	102 W – 200 W
STR-B5058	600 V	1.50 Ω	72 W – 102 W
STR-B5059	600 V	2.45 Ω	Less than 72 W



WARNING — These devices are designed to be operated at lethal voltages and energy levels. Circuit designs that embody these components must conform with applicable safety requirements. Precautions must be taken to prevent accidental contact with power-line potentials. Do not connect grounded test equipment.

The use of an isolation transformer is recommended during circuit development and breadboarding.

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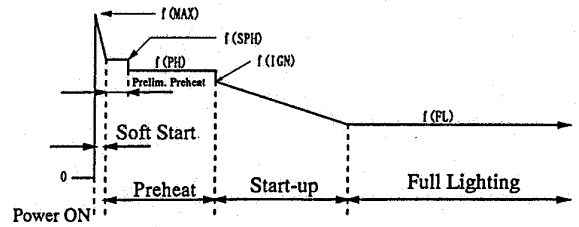
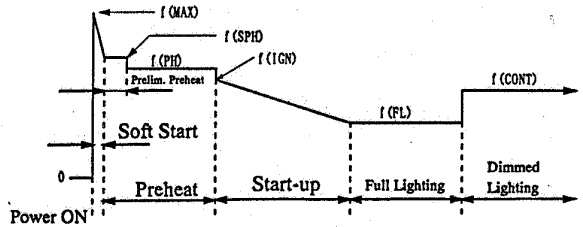
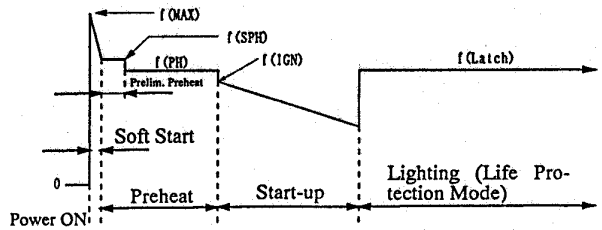
Timing Charts

Operation Mode	External Signal		Timing Chart
	Dimming Signal	Lamp Life End Detection	
Operation Start Sequence in Normal Operation Mode	No	No	
Operation Start Sequence in Dimming Operation Mode	Yes	No	
Operation Start Sequence When Non-Lighting Lamp is Set	Yes/No	Yes	

Terminal Functions

No.	Symbol	Description	Function
1	V_{IN}	Half Bridge Input	Input of power supply for half-bridge circuit.
2	NC	No (internal) Connection	
3	OUT_1	Half Bridge Output	Output of half bridge (high-side source).
4	V_B	High-Side Gate-Drive Input	Input of power supply for high-side gate drive.
5	NC	No (internal) Connection	
6	SENSE	Lamp Life End Detection	Detecting the end of lamp life and transferring it to protection frequency (which is in latch mode).
7	RESET ON/OFF	ON/OFF & Lamp Exchange Reset	Reset of lamp life protection frequency and restart when detection voltage once exceeds V_{RESET} and becomes below V_{RESET} again. Oscillation stops when detection voltage exceeds $V_{ON/OFF}$.
8	V_{CC}	Controller Power Supply	Input of power supply for control circuit.
9	GND	Controller Ground	Ground of control circuit.
10	DRIVE V_{CC}	Gate Drive Circuit Output	Power supply of high-side gate drive (power supply for bootstrap).
11	F_{CONT}	Dimming Signal Input	Adjustment of dimming frequency (adjustable by external resistor).
12	F_{LATCH}	Lamp Life Protection Frequency Adjustment	Adjustment of frequency after detecting the end of lamp life (adjustable by external resistor).
13	F_{FL}	Full Lighting Frequency Adjustment	Adjustment of full lighting frequency (adjustable by external resistor).
14	F_{PH}	Filament Preheating Frequency Adjustment	Adjustment of preheating frequency for filaments (adjustable by external resistor).
15	RC	Deviated Resonant Mode Detection	Prevents shift to sub-resonant (capacitive) operation.
16	COM	Half Bridge Ground	Ground of half-bridge circuit.
17	NC	No (internal) Connection	
18	OUT_2	Half Bridge Output	Output of half bridge (low-side drain).

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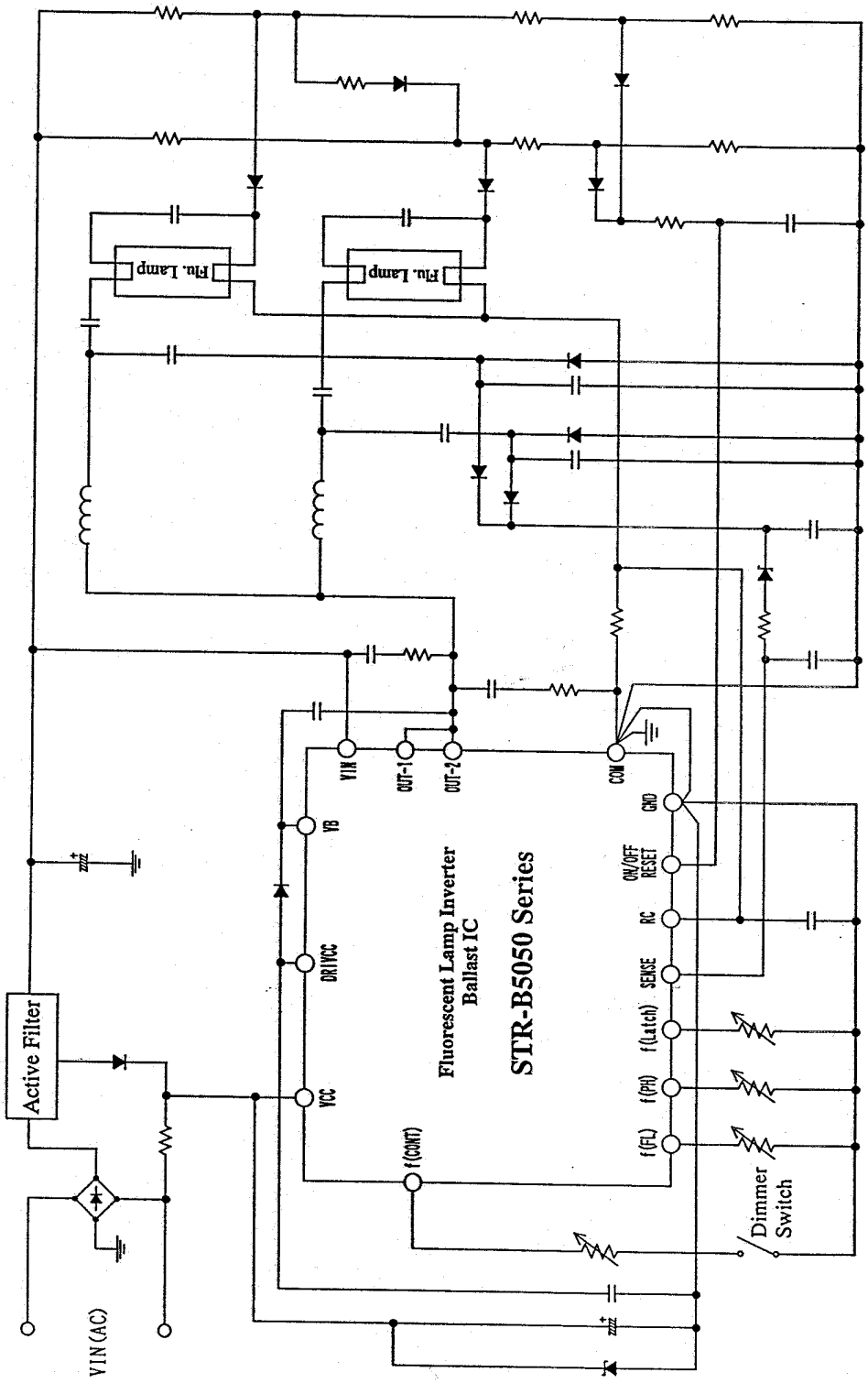
Typical Application



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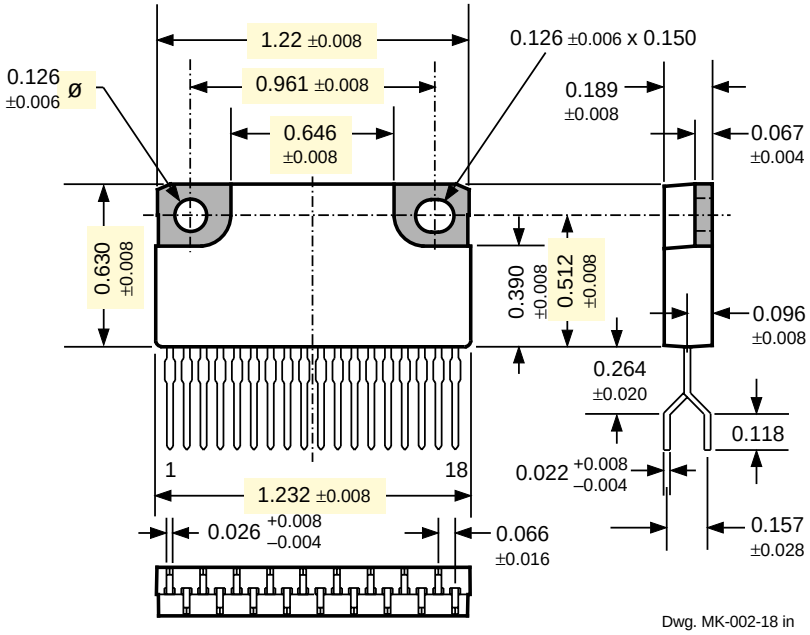
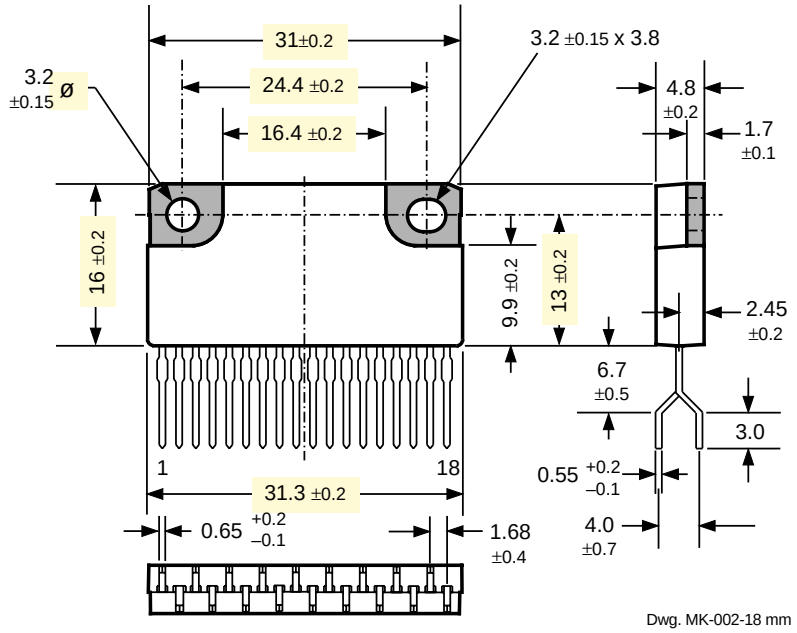
Dimensions in Inches
(for reference only)



Dwg. MK-002-18 in

Dimensions in Millimeters
(controlling dimensions)



Dwg. MK-002-18 mm

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NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
2. Recommended mounting hardware torque: 4.34 – 5.79 lbf•ft (6 – 8 kgf•cm or 0.588 – 0.784 Nm).
3. The shaded area is exposed (electrically isolated) heat spreader.
4. Recommend use of metal-oxide-filled, alkyl-degenerated oil base, silicone grease (Dow Corning 340 or equivalent).

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