



# SANYO Semiconductors

## DATA SHEET

# STK760-712A-E

Thick-Film Hybrid IC  
Single-phase Rectification  
PFC Hybrid IC

### Overview

The STK760-712A-E is a power hybrid IC that incorporates active devices including a bridge diode, IGBT, FRD and a driver circuit necessary for configuring a power factor correction (PFC) circuit in the same package.

### Applications

- Power rectification for air conditioners and general-purpose inverters as a single-phase rectification active converter.

### Features

- Power devices including a bridge diode, IGBT, and FRD necessary for configuring a PFC circuit are integrated in a single package.
- Full switching PFC circuit for single-phase 200V/20A can be configured.
- Significantly increased flexibility in mounting in end products

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# STK760-712A-E

## Specifications

**Absolute maximum ratings** at  $T_a = 25^\circ\text{C}$ ,  $T_c = 25^\circ\text{C}$  otherwise unless specified.

Parameter		Symbol	Conditions	Ratings	unit
IGBT (TR1+TR2)	Collector-to-emitter voltage	V <sub>CE</sub> S		600	V
	Gate-to-emitter voltage	V <sub>GE</sub> S		±20	V
	Repetitive peak collector current	I <sub>CP</sub>	*1	160	A
	Collector current	I <sub>C</sub>		66	A
	Allowable power dissipation	P <sub>d</sub>		113	W
BD (D1 to D4)	Diode reverse voltage	V <sub>RM</sub>		600	V
	Peak one cycle surge current	I <sub>FSM</sub>	*2	220	A
	I <sup>2</sup> t value	I <sup>2</sup> t	1ms≤t<10ms	180	A <sup>2</sup> s
	Forward Current	I <sub>F</sub>		35	A
	Allowable power dissipation	P <sub>d</sub>		43	W
FRD (D5)	Peak one cycle surge current	I <sub>FSM</sub>	*1	15	A
	Forward current	I <sub>F</sub>		8	A
	Allowable power dissipation	P <sub>d</sub>		13	W
FRD (D6)	Peak repetitive reverse voltage	V <sub>RM</sub>		600	V
	Peak one cycle surge current	I <sub>FSM</sub>	*2	220	A
	Forward current	I <sub>F</sub>		35	A
	Allowable power dissipation	P <sub>d</sub>		62	W
Supply voltage (Pin 8)	V <sub>CC</sub>			20	V
Signal pin input voltage (Pin 9)	V <sub>IN</sub>			V <sub>CC</sub>	V
Switching frequency	f <sub>c</sub>	Under the operating conditions of the application circuit		25	kHz
Input current (in steady state)	I <sub>IN</sub> (AC)	Under the operating conditions of the application circuit. T <sub>c</sub> =100°C, f <sub>c</sub> =20kHz		20	Arms
Junction temperature	T <sub>J</sub>			150	°C
Operating case temperature	T <sub>c</sub>	Center of the resin package on the reverse side		-20 to +100	°C
Storage temperature	T <sub>stg</sub>			-40 to +125	°C
Tightening torque		Screw installation part *3		1.0	N • m
Dielectric strength voltage	V <sub>INS</sub>	Sine wave, 50Hz, AC 1 minute *4		2000	VRMS

\*1. Repetitive peak current with the duty ratio of D=0.1 and tp=1ms.

\*2. 50Hz sine wave, non-repetitive one cycle peak current.

\*3. The flatness of the heat sink to be connected must be 0.15mm or less.

\*4. Test conditions: AC 2500V for 1 second.

## Electrical Characteristics at T<sub>c</sub>=25°C

Parameter	Symbol	Conditions	min	typ	max	unit
IGBT						
Collector-to-emitter cutoff current (TR1+TR2)	I <sub>CE</sub> S	V <sub>CE</sub> =600V			200	μA
Collector-to-emitter saturation voltage (TR1+TR2)	V <sub>CE</sub> (sat)	V <sub>GR</sub> =15V, I <sub>C</sub> =40A (T <sub>c</sub> =25°C)		1.4	1.9	V
		V <sub>GR</sub> =15V, I <sub>C</sub> =40A (T <sub>c</sub> =100°C)		1.5		V
Gate threshold voltage	V <sub>GE</sub> (th)	V <sub>CE</sub> =V <sub>GE</sub> , I <sub>C</sub> =430μA	3.75		5.75	μA
Junction-to-case thermal resistance	θ <sub>j-c</sub>			1.1		°C/W
D1 to D4						
Diode reverse current	I <sub>R</sub>	V <sub>R</sub> =600V			20	μA
Forward voltage	V <sub>F</sub>	I <sub>F</sub> =30A (10ms Pulse)		1.15	1.5	V
Junction-to-case thermal resistance	θ <sub>j-c</sub>			2.9		°C/W
D5						
Forward voltage	V <sub>F</sub>	I <sub>F</sub> =5A (10ms Pulse)		1.2	1.7	V
Junction-to-case thermal resistance	θ <sub>j-c</sub>			9		°C/W

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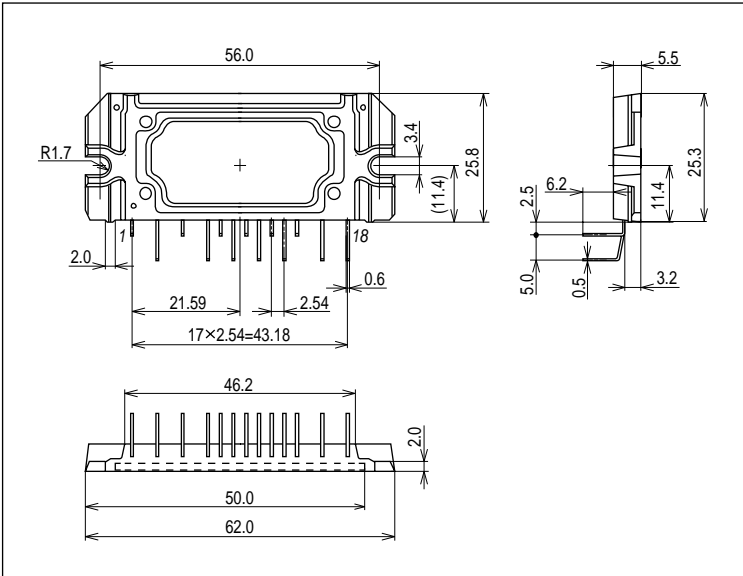
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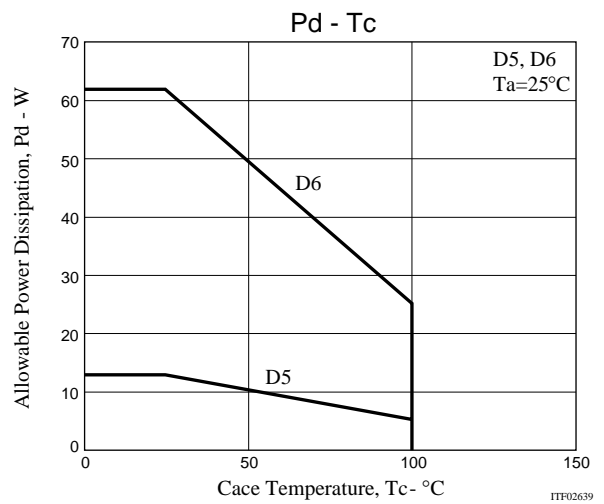
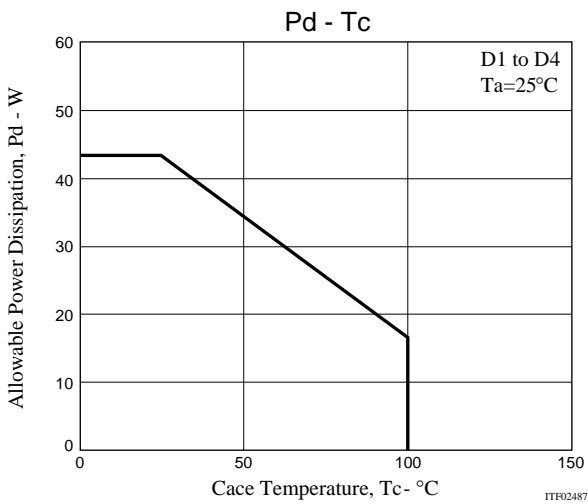
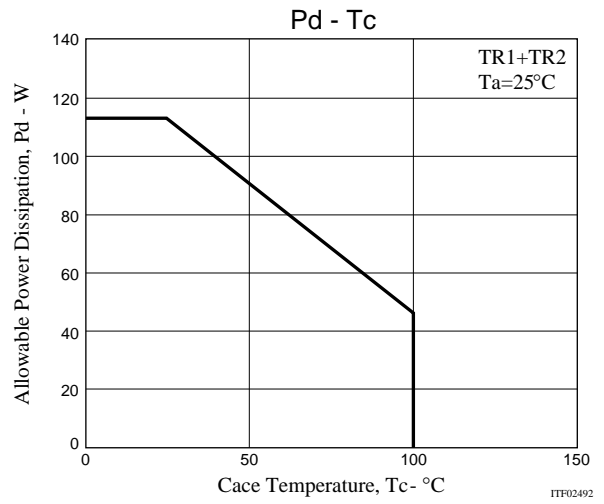
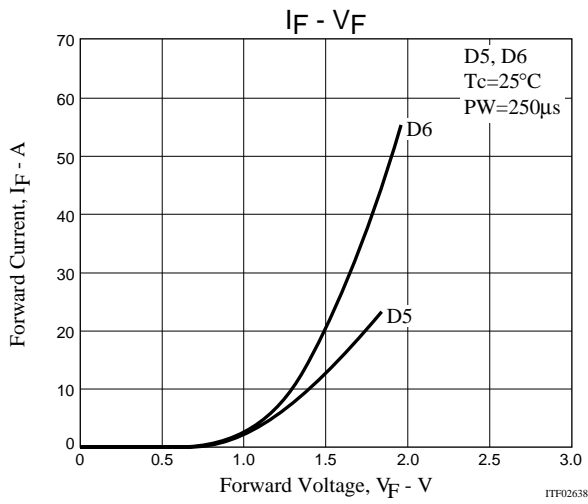
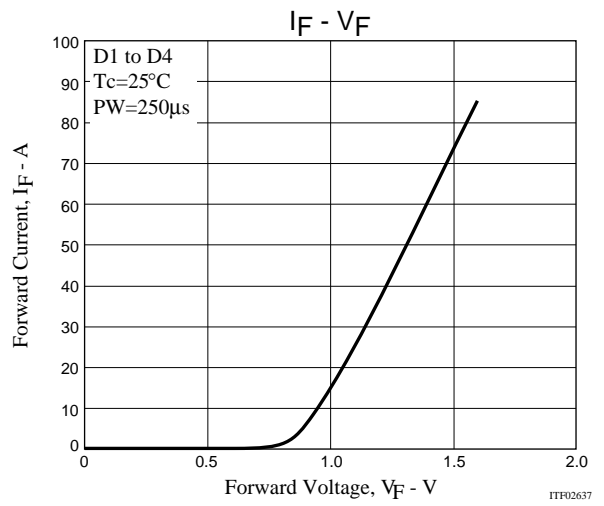
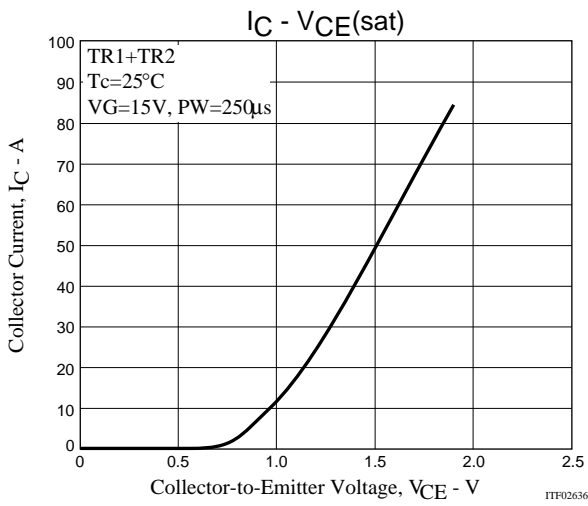
Parameter	Symbol	Conditions	min	typ	max	unit
D6						
Diode reverse current	IR	VR=600V			100	μA
Forward voltage	V <sub>F</sub>	I <sub>F</sub> =30A (10ms Pulse)		1.65	2.1	V
Junction-to-case thermal resistance	θ <sub>j-c</sub>			2.0		°C/W
Drive circuit / Output block						
V <sub>IN(ON)</sub> Threshold voltage	V <sub>IN(ON)th</sub>	V <sub>IN</sub> =V <sub>CC</sub> =V <sub>C</sub> , I <sub>C</sub> =430μA	4.1		6.3	V
V <sub>IN</sub> Leak current (Pin 9)	I <sub>IN(leak)</sub>	V <sub>IN</sub> =0 to 15V, V <sub>CC</sub> =15V, V <sub>CE</sub> =0V			10	μA
Switching time	t <sub>ON</sub>	I <sub>C</sub> =30A, V <sub>CC</sub> =15V, R <sub>CC</sub> =47Ω		150		ns
	t <sub>OFF</sub>	R <sub>B</sub> =200Ω, Inductive load		500		ns
	t <sub>rr</sub>	I <sub>F</sub> =30A, di/dt=-100A/μs		45		ns

## Package Dimensions

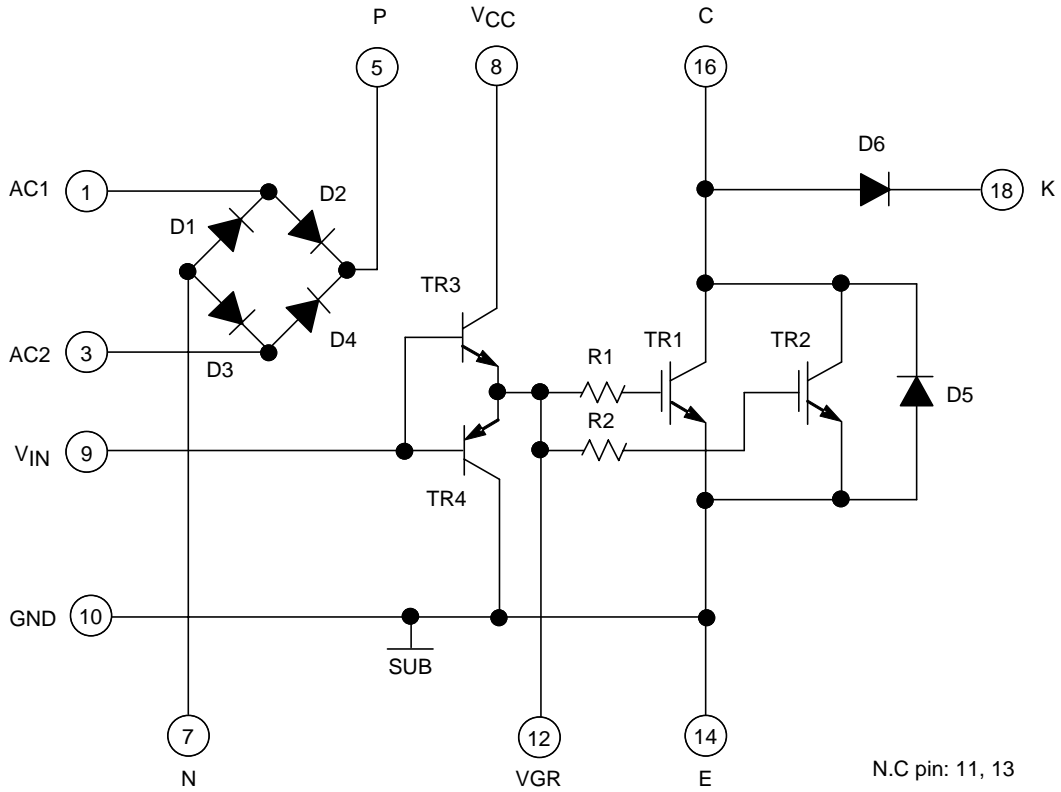
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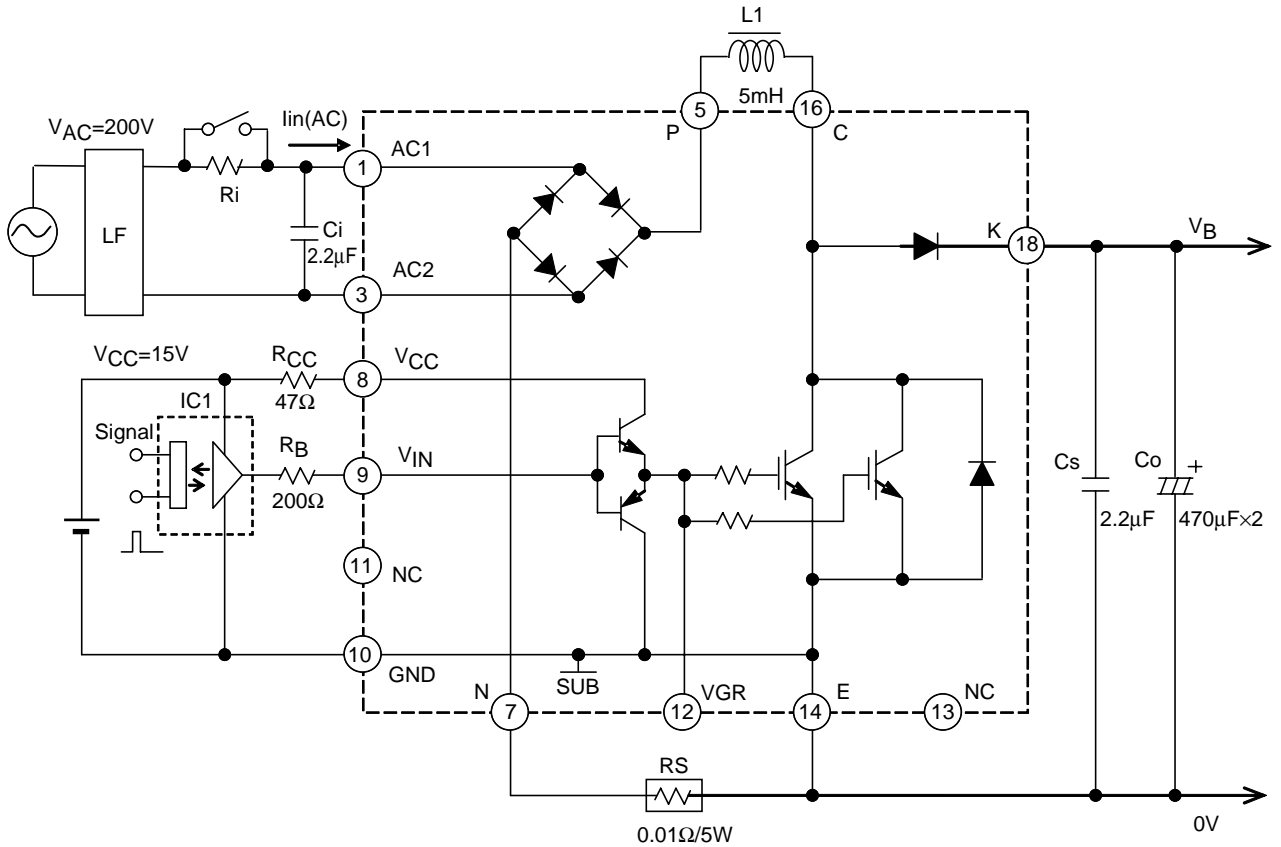
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Equivalent Circuit Diagram



Sample Application Circuit



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