Bulletin I27214 03/06

International
IOR Rectifier

IRK.26..PbF SERIES

THYRISTOR/ DIODE and THYRISTOR/ THYRISTOR

ADD-A-pak™ GEN V Power Modules

Features

- High Voltage
- Industrial Standard Package
- Thick copper baseplate
- UL E78996 approved
- 3500V_{RMS} isolating voltage
- TOTALLY LEAD-FREE

Benefits

- Up to 1600V
- Full compatible TO-240AA
- High Surge capability
- Easy Mounting on heatsink
- Al_2O_3 DBC insulator
- Heatsink grounded

27 A

Mechanical Description

The Generation V of Add-A-pak module combine the excellent thermal performance obtained by the usage of Direct Bonded Copper substrate with superior mechanical ruggedness, thanks to the insertion of a solid Copper baseplate at the bottom side of the device.

The Cu baseplate allow an easier mounting on the majority of heatsink with increased tolerance of surface roughness and improve thermal spread.

The Generation V of AAP module is manufactured without hard mold, eliminating in this way any possible direct stress on the leads.

The electrical terminals are secured against axial pull-out: they are fixed to the module housing via a click-stop feature already tested and proved as reliable on other IR modules.

Electrical Description

These modules are intended for general purpose high voltage applications such as high voltage regulated power supplies, lighting circuits, temperature and motor speed control circuits, UPS and battery charger.

Major Ratings and Characteristics

Parameters	IRK.26	Units
$I_{T(AV)}$ or $I_{F(AV)}$ @85°C	27	A
$I_{O(RMS)}$ (*)	60	A
I_{TSM} @50Hz	400	A
I_{FSM} @60Hz	420	A
I^2t @50Hz	800	A^2s
@60Hz	730	A^2s
$I^2\sqrt{t}$	8000	$A^2\sqrt{s}$
V_{RRM} range	400 to 1600	V
T_{STG}	-40 to 125	°C
T_J	-40 to 125	°C

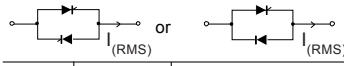
(*) As AC switch.

ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code -	V_{RRM}, maximum repetitive peak reverse voltage V	V_{RSM}, maximum non-repetitive peak reverse voltage V	V_{DRM}, max. repetitive peak off-state voltage, gate open circuit V	I_{RRM} I_{DRM} 125°C mA
IRK.26	04	400	500	400	15
	06	600	700	600	
	08	800	900	800	
	10	1000	1100	1000	
	12	1200	1300	1200	
	14	1400	1500	1400	
	16	1600	1700	1600	

On-state Conduction

Parameters		IRK.26	Units	Conditions		
$I_{T(AV)}$	Max. average on-state current (Thyristors)	27	A	180° conduction, half sine wave, T_C = 85°C		
$I_{F(AV)}$	Max. average forward current (Diodes)	27				
$I_{O(RMS)}$	Max. continuous RMS on-state current. As AC switch	60				
I_{TSM} or I_{FSM}	Max. peak, one cycle non-repetitive on-state or forward current	400		t=10ms	No voltage reapplied	Sinusoidal half wave, Initial T_J = T_J max.
		420		t=8.3ms		
		335		t=10ms	100% V_{RRM} reapplied	
		350		t=8.3ms		
		470		t=10ms	T_J = 25°C, no voltage reapplied	
		490		t=8.3ms		
I^2t	Max. I^2t for fusing	800	A^2s	t=10ms	No voltage reapplied	Initial T_J = T_J max.
		730		t=8.3ms		
		560		t=10ms	100% V_{RRM} reapplied	
		510		t=8.3ms		
		1100		t=10ms	T_J = 25°C, no voltage reapplied	
		1000		t=8.3ms		
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ for fusing (1)	8000	$A^2\sqrt{s}$	t=0.1 to 10ms, no voltage reappl. T_J=T_J max		
$V_{T(TO)}$	Max. value of threshold voltage (2)	0.92	V	Low level (3)		T_J = T_J max
		0.95		High level (4)		
r_t	Max. value of on-state slope resistance (2)	12.11	mΩ	Low level (3)		T_J = T_J max
		11.82		High level (4)		
V_{TM} / V_{FM}	Max. peak on-state or forward voltage	1.95	V	I_{TM} = π x $I_{T(AV)}$		T_J = 25°C
				I_{FM} = π x $I_{F(AV)}$		
di/dt	Max. non-repetitive rate of rise of turned on current	150	A/µs	T_J = 25°C, from 0.67 V_{DRM}, I_{TM} = π x $I_{T(AV)}$, I_g = 500mA, t_r < 0.5 µs, t_p > 6 µs		
I_H	Max. holding current	200	mA	T_J = 25°C, anode supply = 6V, resistive load, gate open circuit		
I_L	Max. latching current	400		T_J = 25°C, anode supply = 6V, resistive load		

(1) I^2t for time t_x = $I^2\sqrt{t}$ x $\sqrt{t_x}$ (2) Average power = $V_{T(TO)}$ x $I_{T(AV)}$ + r_t x $(I_{T(RMS)})^2$ (3) 16.7% x π x I_{AV} < I < π x I_{AV}
(4) I > π x I_{AV}

Triggering

	Parameters	IRK.26	Units	Conditions	
P_{GM}	Max. peak gate power	10	W		
$P_{G(AV)}$	Max. average gate power	2.5			
I_{GM}	Max. peak gate current	2.5	A		
$-V_{GM}$	Max. peak negative gate voltage	10	V		
V_{GT}	Max. gate voltage required to trigger	4.0		T_J = -40°C	Anode supply = 6V resistive load
		2.5		T_J = 25°C	
		1.7		T_J = 125°C	
I_{GT}	Max. gate current required to trigger	270	mA	T_J = -40°C	Anode supply = 6V resistive load
		150		T_J = 25°C	
		80		T_J = 125°C	
V_{GD}	Max. gate voltage that will not trigger	0.25	V	T_J = 125°C, rated V_{DRM} applied	
I_{GD}	Max. gate current that will not trigger	6	mA	T_J = 125°C, rated V_{DRM} applied	

Blocking

	Parameters	IRK.26	Units	Conditions
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current at V_{RRM}, V_{DRM}	15	mA	T_J = 125°C, gate open circuit
V_{INS}	RMS isolation voltage	2500 (1 min)	V	50 Hz, circuit to base, all terminals
		3500 (1 sec)		shorted
dv/dt	Max. critical rate of rise	500	V/µs	T_J = 125°C, linear to 0.67 V_{DRM},

(5) Available with dv/dt = 1000V/µs, to complete code add S90 i.e. IRKT26/16AS90.

Thermal and Mechanical Specifications

	Parameters	IRK.26	Units	Conditions
T_J	Junction operating temperature range	- 40 to 125	°C	
T_{stg}	Storage temp. range	- 40 to 125		
R_{thJC}	Max. internal thermal resistance, junction to case	0.31	K/W	Per module, DC operation
R_{thCS}	Typical thermal resistance case to heatsink	0.1		Mounting surface flat, smooth and greased
T	Mounting torque ± 10% to heatsink	5	Nm	A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound
	busbar	3		
wt	Approximate weight	110 (4)	gr (oz)	
	Case style	TO-240AA	JEDEC	

ΔR Conduction (per Junction)

(The following table shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC)

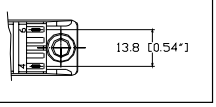
Devices	Sine half wave conduction					Rect. wave conduction					Units
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
IRK.26	0.23	0.27	0.34	0.48	0.73	0.17	0.28	0.36	0.49	0.73	°C/W

Ordering Information Table

Device Code

IRK	T	26	/	16	S90	P
①	②	③		④	⑤	⑥

IRK.27 types
With no auxiliary cathode

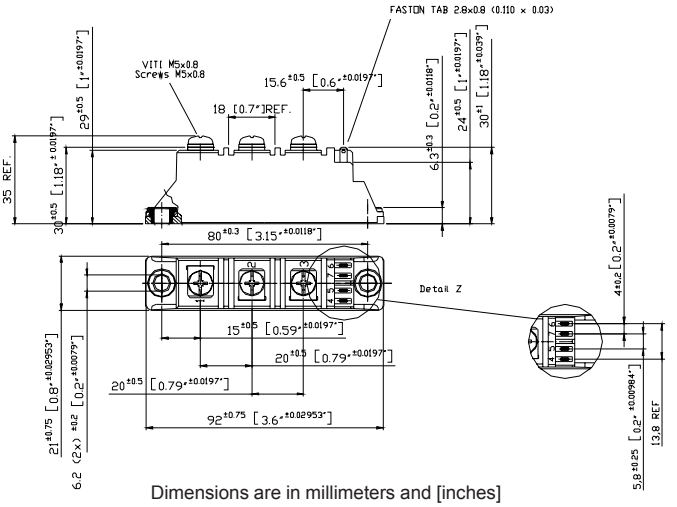


1 - Module type
2 - Circuit configuration (See Circuit Configuration table below)
3 - Current code * *
4 - Voltage code (See Voltage Ratings table)
5 - dv/dt code: S90 = dv/dt 1000 V/µs
No letter = dv/dt 500 Vµs
6 - P = Lead-Free

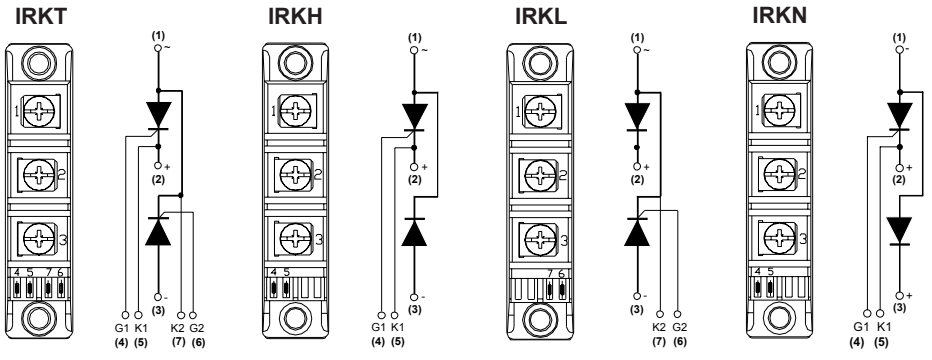
* * Available with no auxiliary cathode.
To specify change: 26 to 27

e.g. : IRKT27/16P etc.

Outline Table



Dimensions are in millimeters and [inches]



NOTE: To order the Optional Hardware see Bulletin I27900

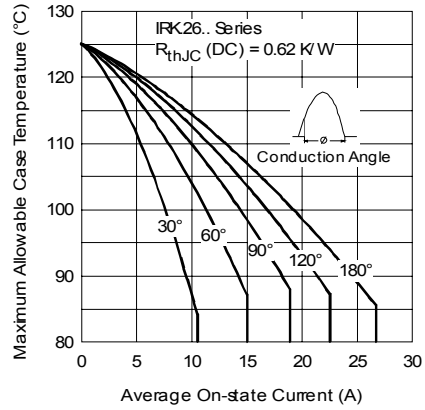


Fig. 1 - Current Ratings Characteristics

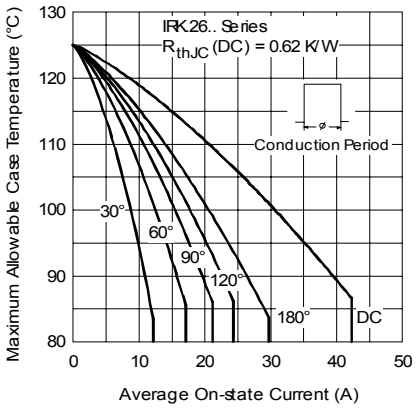


Fig. 2 - Current Ratings Characteristics

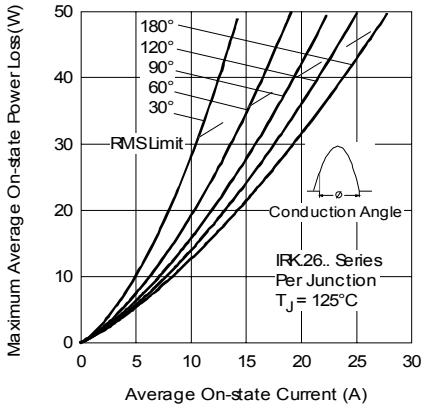


Fig. 3 - On-state Power Loss Characteristics

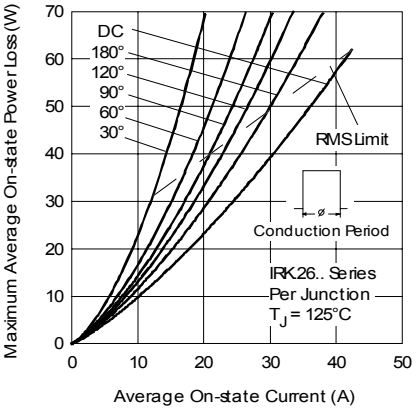


Fig. 4 - On-state Power Loss Characteristics

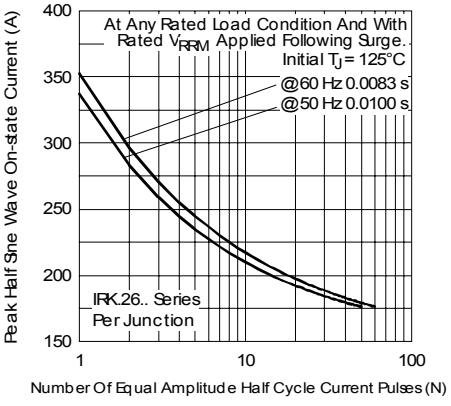


Fig. 5 - Maximum Non-Repetitive Surge Current

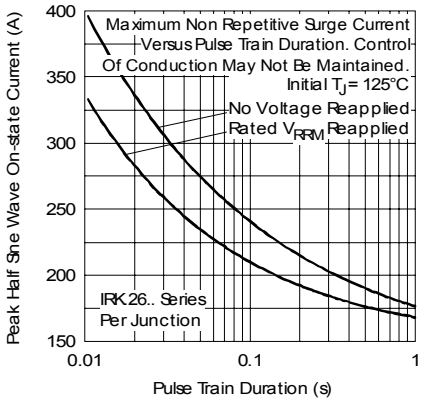


Fig. 6 - Maximum Non-Repetitive Surge Current

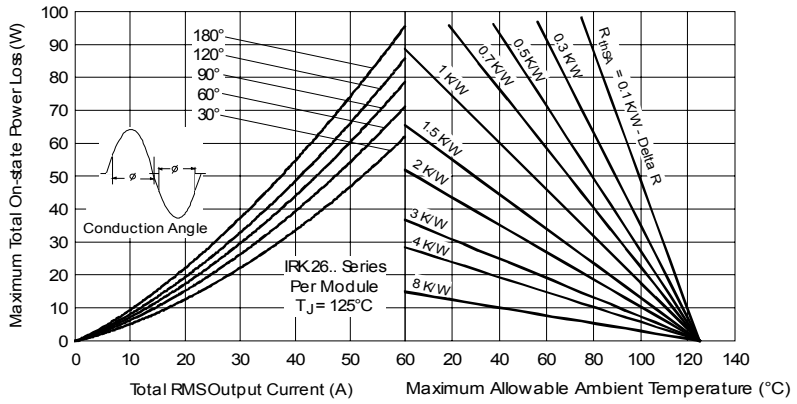


Fig. 7 - On-state Power Loss Characteristics

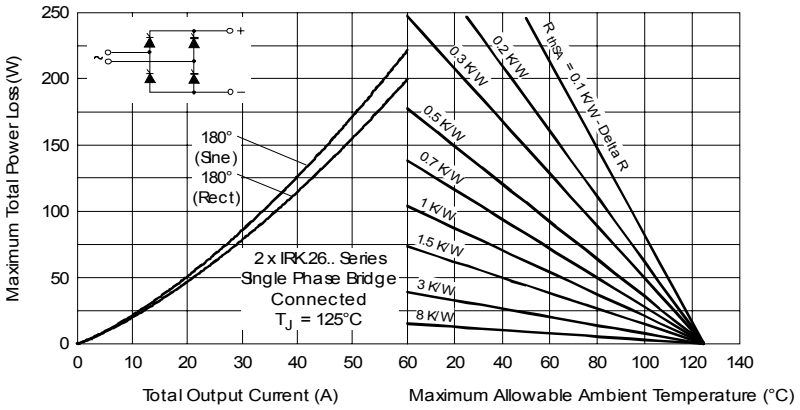


Fig. 8 - On-state Power Loss Characteristics

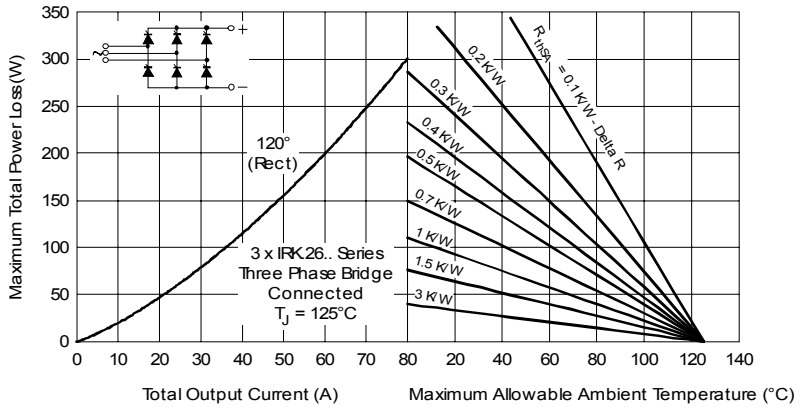


Fig. 9 - On-state Power Loss Characteristics

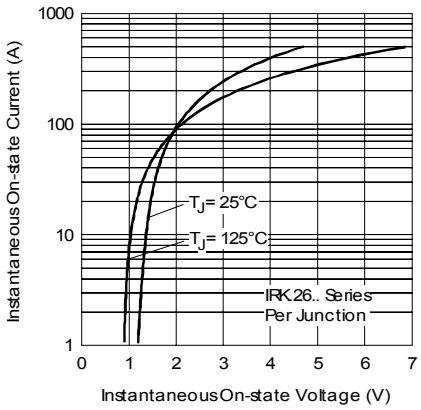


Fig. 10 - On-state Voltage Drop Characteristics

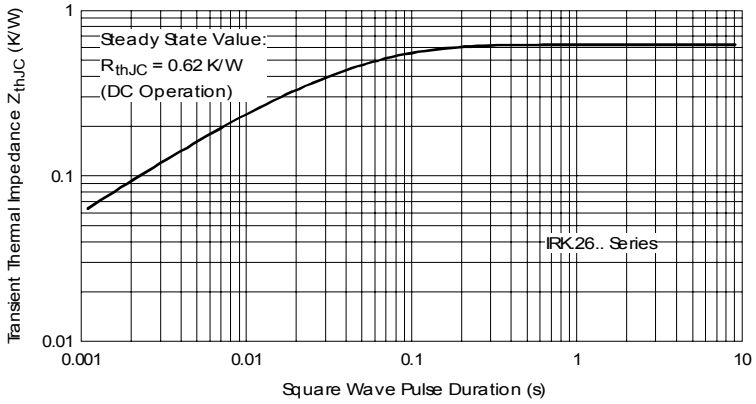


Fig. 11 - Thermal Impedance Z_{thJC} Characteristics

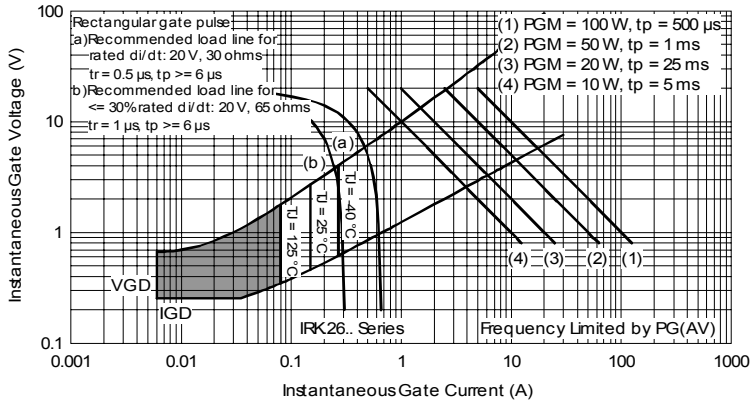


Fig. 12- Gate Characteristics

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level and Lead-Free.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
03/06

Notice

The products described herein were acquired by Vishay Intertechnology, Inc., as part of its acquisition of International Rectifier's Power Control Systems (PCS) business, which closed in April 2007. Specifications of the products displayed herein are pending review by Vishay and are subject to the terms and conditions shown below.

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.

International Rectifier®, IR®, the IR logo, HEXFET®, HEXSense®, HEXDIP®, DOL®, INTERO®, and POWIRTRAIN® are registered trademarks of International Rectifier Corporation in the U.S. and other countries. All other product names noted herein may be trademarks of their respective owners.