

ST303C..L SERIES

INVERTER GRADE THYRISTORS

Hockey Puk Version

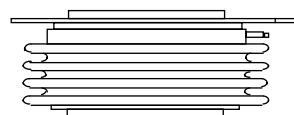
Features

- Metal case with ceramic insulator
- International standard case TO-200AC (B-PUK)
- All diffused design
- Center amplifying gate
- Guaranteed high dV/dt
- Guaranteed high dI/dt
- High surge current capability
- Low thermal impedance
- High speed performance

Typical Applications

- Inverters
- Choppers
- Induction heating
- All types of force-commutated converters

515A



case style TO-200AC (B-PUK)

Major Ratings and Characteristics

Parameters	ST303C..L	Units
$I_{T(AV)}$	515	A
@ T_{hs}	55	°C
$I_{T(RMS)}$	995	A
@ T_{hs}	25	°C
I_{TSM}	@ 50Hz	7950
	@ 60Hz	8320
I^2t	@ 50Hz	316
	@ 60Hz	289
V_{DRM}/V_{RRM}	400 to 1200	V
t_q range (*)	10 to 30	μs
T_J	- 40 to 125	°C

(*) t_q = 10 to 20μs for 400 to 800V devices
 t_q = 15 to 30μs for 1000 to 1200V devices

ST303C..L Series

Bulletin I25186 rev.B 04/00

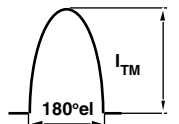
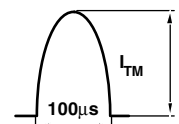
International
TOR Rectifier

ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM} , maximum repetitive peak voltage V	V_{RSM} , maximum non-repetitive peak voltage V	I_{DRM}/I_{RRM} max. @ $T_J = T_J$ max. mA
ST303C..L	04	400	500	50
	08	800	900	
	10	1000	1100	
	12	1200	1300	

Current Carrying Capability

Frequency							Units
50Hz	1130	950	1800	1540	5660	4990	A
400Hz	1010	820	1850	1570	2830	2420	
1000Hz	680	530	1560	1300	1490	1220	
2500Hz	230	140	690	510	540	390	
Recovery voltage Vr	50	50	50	50	50	50	V
Voltage before turn-on Vd	V _{DRM}		V _{DRM}		V _{DRM}		
Rise of on-state current di/dt	50	50	-	-	-	-	A/µs
Heatsink temperature	40	55	40	55	40	55	°C
Equivalent values for RC circuit	10Ω / 0.47µF		10Ω / 0.47µF		10Ω / 0.47µF		

On-state Conduction

Parameter	ST303C..L	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	515 (190) 55 (85)	A °C	180° conduction, half sine wave double side (single side) cooled
$I_{T(RMS)}$ Max. RMS on-state current	995	A	DC @ 25°C heatsink temperature double side cooled
I_{TSM} Max. peak, one half cycle, non-repetitive surge current	7950		t = 10ms No voltage
	8320		t = 8.3ms reapplied
	6690		t = 10ms 100% V_{RRM}
	7000		t = 8.3ms reapplied
I^2t Maximum I^2t for fusing	316	KA²s	t = 10ms No voltage
	289		t = 8.3ms reapplied
	224		t = 10ms 100% V_{RRM}
	204		t = 8.3ms reapplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	3160	KA²√s	t = 0.1 to 10ms, no voltage reapplied

On-state Conduction

Parameter	ST303C..L	Units	Conditions
V_{TM} Max. peak on-state voltage	2.16	V	$I_{TM} = 1255A$, $T_J = T_J \text{ max}$, $t_p = 10\text{ms}$ sine wave pulse
$V_{T(TO)1}$ Low level value of threshold voltage	1.44		$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J \text{ max}$.
$V_{T(TO)2}$ High level value of threshold voltage	1.48		$(I > \pi \times I_{T(AV)})$, $T_J = T_J \text{ max}$.
r_{t1} Low level value of forward slope resistance	0.57	mΩ	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J \text{ max}$.
r_{t2} High level value of forward slope resistance	0.56		$(I > \pi \times I_{T(AV)})$, $T_J = T_J \text{ max}$.
I_H Maximum holding current	600	mA	$T_J = 25^\circ\text{C}$, $I_T > 30A$
I_L Typical atching current	1000		$T_J = 25^\circ\text{C}$, $V_A = 12V$, $R_a = 6\Omega$, $I_G = 1A$

Switching

Parameter	ST303C..L	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	1000	A/μs	$T_J = T_J \text{ max}$, $V_{DRM} = \text{rated } V_{DRM}$ $I_{TM} = 2 \times di/dt$
t_d Typical delay time	0.83	μs	$T_J = 25^\circ\text{C}$, $V_{DM} = \text{rated } V_{DRM}$, $I_{TM} = 50A \text{ DC}$, $t_p = 1\mu\text{s}$ Resistive load Gate pulse: 10V, 5Ω source
t_q Max. turn-off time (*)	Min 10 Max 30		$T_J = T_J \text{ max}$, $I_{TM} = 550A$, commutating $di/dt = 40A/\mu\text{s}$ $V_R = 50V$, $t_p = 500\mu\text{s}$, dv/dt : see table in device code

(*) $t_q = 10$ to $20\mu\text{s}$ for 400 to 800V devices; $t_q = 15$ to $30\mu\text{s}$ for 1000 to 1200V devices.

Blocking

Parameter	ST303C..L	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/μs	$T_J = T_J \text{ max}$. linear to 80% V_{DRM} , higher value available on request
I_{RRM} Max. peak reverse and off-state leakage current	50	mA	$T_J = T_J \text{ max}$, rated V_{DRM}/V_{RRM} applied

Triggering

Parameter	ST303C..L	Units	Conditions
P_{GM} Maximum peak gate power	60	W	$T_J = T_J \text{ max}$, $f = 50\text{Hz}$, $d\% = 50$
$P_{G(AV)}$ Maximum average gate power	10		
I_{GM} Max. peak positive gate current	10	A	$T_J = T_J \text{ max}$, $t_p \leq 5\text{ms}$
$+V_{GM}$ Maximum peak positive gate voltage	20	V	$T_J = T_J \text{ max}$, $t_p \leq 5\text{ms}$
$-V_{GM}$ Maximum peak negative gate voltage	5		
I_{GT} Max. DC gate current required to trigger	200	mA	$T_J = 25^\circ\text{C}$, $V_A = 12V$, $R_a = 6\Omega$
V_{GT} Max. DC gate voltage required to trigger	3	V	
I_{GD} Max. DC gate current not to trigger	20	mA	$T_J = T_J \text{ max}$, rated V_{DRM} applied
V_{GD} Max. DC gate voltage not to trigger	0.25	V	

Bulletin 125186 rev. B 04/00

Parameter	ST303C..L	Units	Conditions
J Max. operating temperature range	-40 to 125	°C	
T _{stg} Max. storage temperature range	-40 to 150		
R _{thJ-hs} Max. thermal resistance, junction to heatsink	0.11 0.05	K/W	DC operation single side cooled DC operation double side cooled
R _{thC-hs} Max. thermal resistance, case to heatsink	0.011 0.005	K/W	DC operation single side cooled DC operation double side cooled
F Mounting force, ± 10%	9800 (1000)	N (Kg)	
wt Approximate weight	250	g	
Case style	TO - 200AC (B-PUK)		See Outline Table

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

Conduction angle	Sinusoidal conduction		Rectangular conduction		Units	Conditions
	Single Side	Double Side	Single Side	Double Side		
180°	0.012	0.010	0.008	0.008	K/W	T _J = T _J max.
120°	0.014	0.015	0.014	0.014		
90°	0.018	0.018	0.019	0.019		
60°	0.026	0.027	0.027	0.028		
30°	0.045	0.046	0.046	0.046		

Device Code

ST	30	3	C	12	L	H	K	1	
----	----	---	---	----	---	---	---	---	--

① ② - ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① = Fast-on term. (Gate and Aux. Cathode Unsoldered Leads)
 ② = Eyelet term. (Gate and Aux. Cathode Soldered Leads)
 ③ = Fast-on term. (Gate and Aux. Cathode Soldered Leads)
 - Critical dv/dt:
 None = 500V/μsec (Standard value)
 L = 1000V/μsec (Special selection)

dv/dt - t_q combinations available

	dv/dt (V/μs)	20	50	100	200	400
t _q (μs)	10	CN	DN	EN	FN *	HN
	12	CM	DM	EM	FM	HM
	15	CL	DL	EL	FL *	HL
	20	CK	DK	EK	FK *	HK
t _q (μs)	15	CL	--	--	--	--
	18	CP	DP	--	--	--
	20	CK	DK	EK	FK *	HK
	25	CJ	DJ	EJ	FJ *	HJ
	30	--	DH	EH	FH	HH

*Standard part number.
 All other types available only on request.

Outline Table

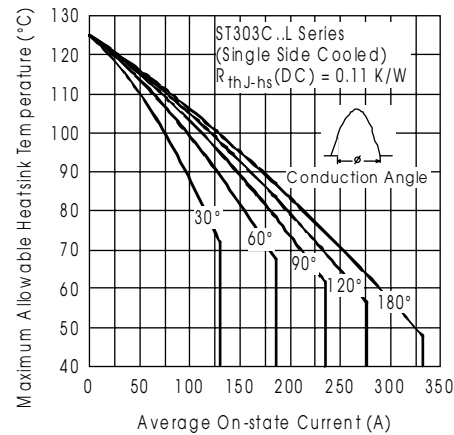
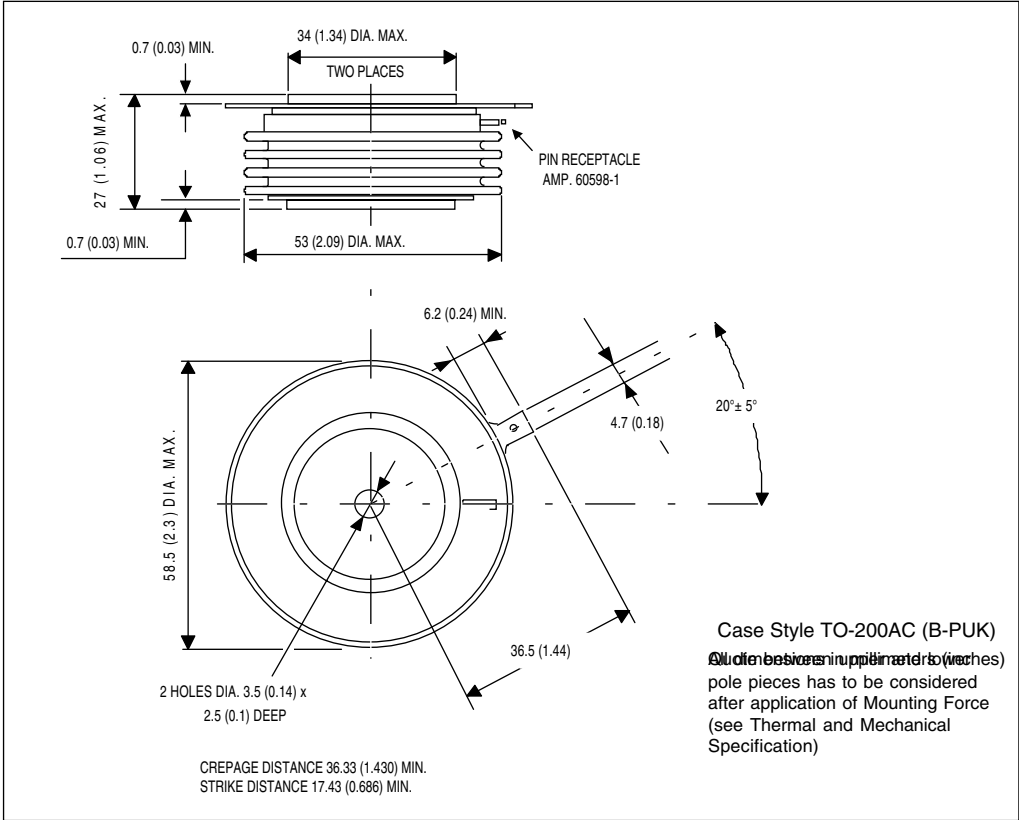


Fig. 1 - Current Ratings Characteristics

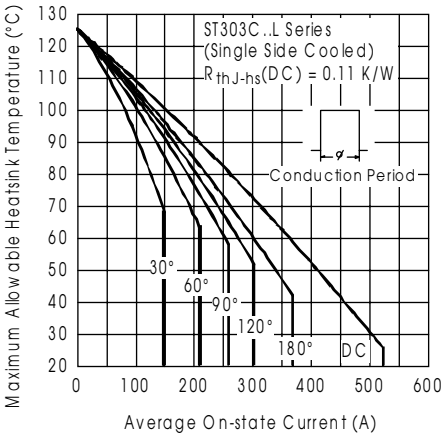


Fig. 2 - Current Ratings Characteristics

ST303C..L Series

Bulletin I25186 rev. B 04/00

International
IOR Rectifier

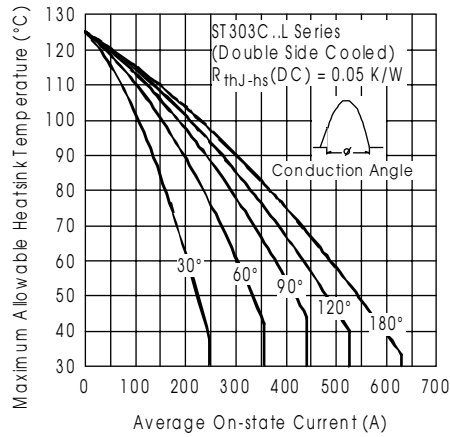


Fig. 3 - Current Ratings Characteristics

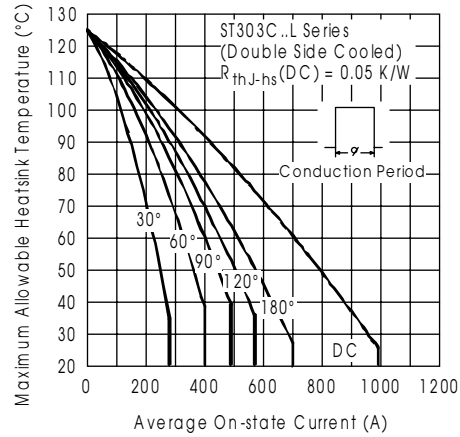


Fig. 4 - Current Ratings Characteristics

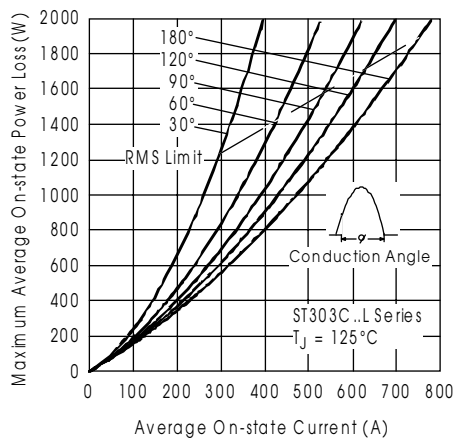


Fig. 5 - On-state Power Loss Characteristics

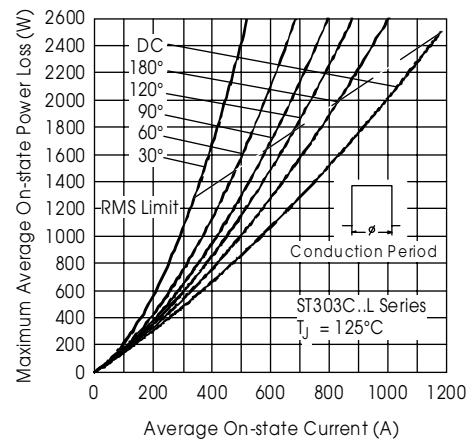


Fig. 6 - On-state Power Loss Characteristics

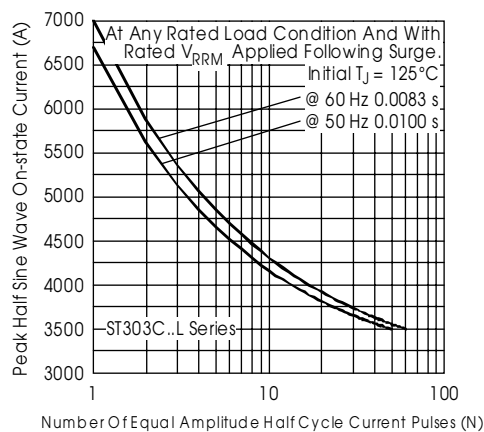


Fig. 7 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

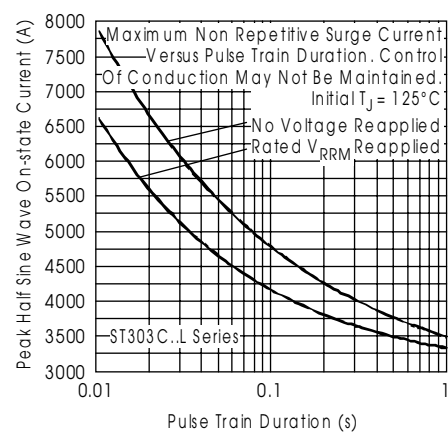


Fig. 8 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

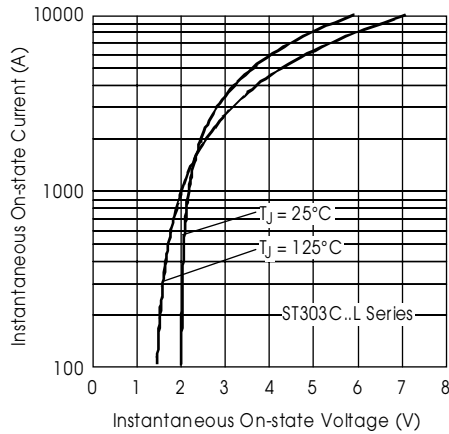


Fig. 9 - On-state Voltage Drop Characteristics

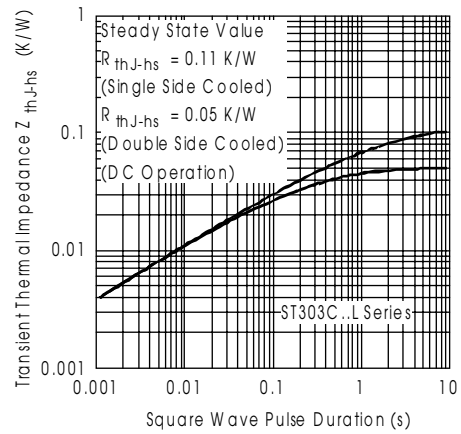


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

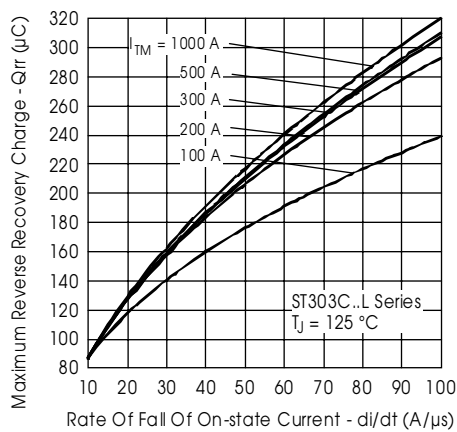


Fig. 11 - Reverse Recovered Charge Characteristics

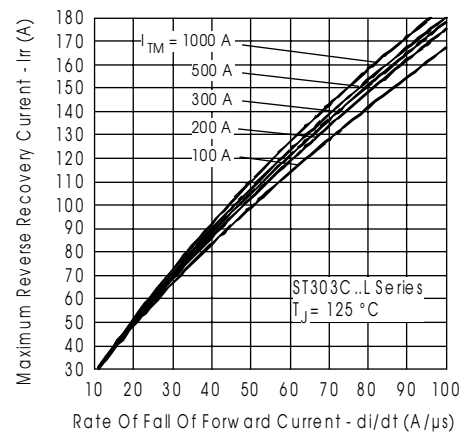


Fig. 12 - Reverse Recovery Current Characteristics

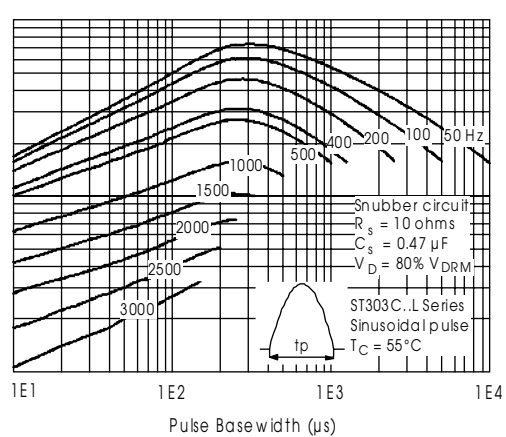
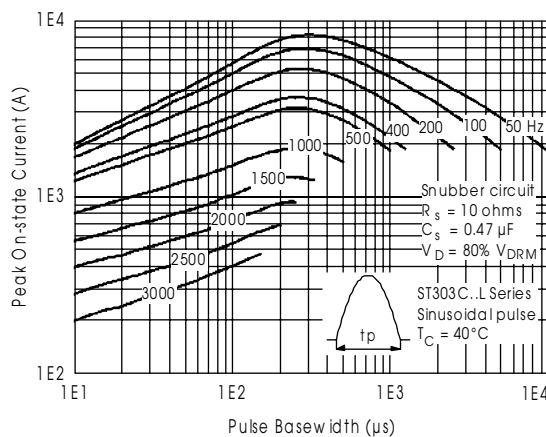


Fig. 13 - Frequency Characteristics

ST303C..L Series

Bulletin I25186 rev. B 04/00

International
IOR Rectifier

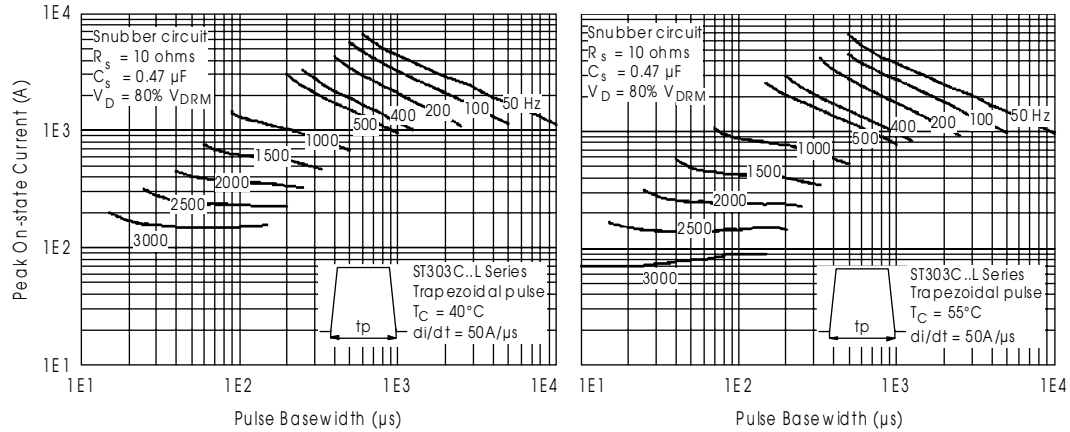


Fig. 14 - Frequency Characteristics

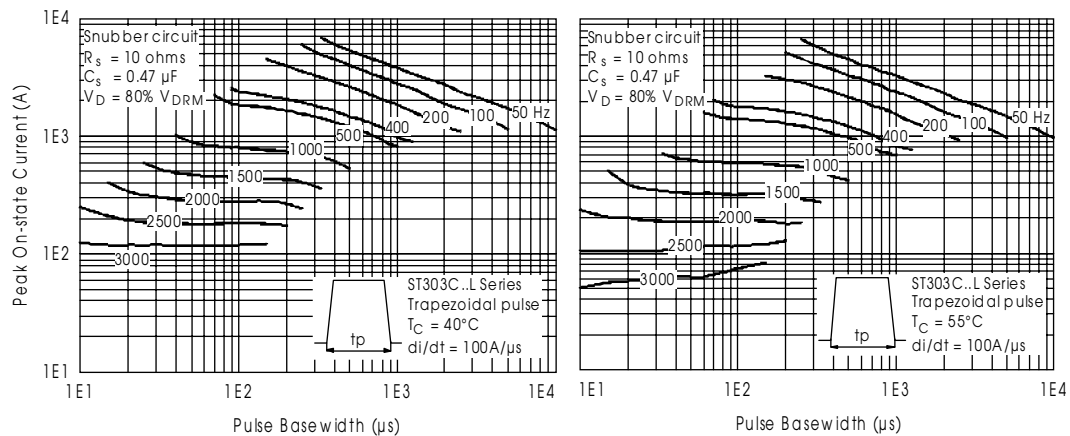


Fig. 15 - Frequency Characteristics

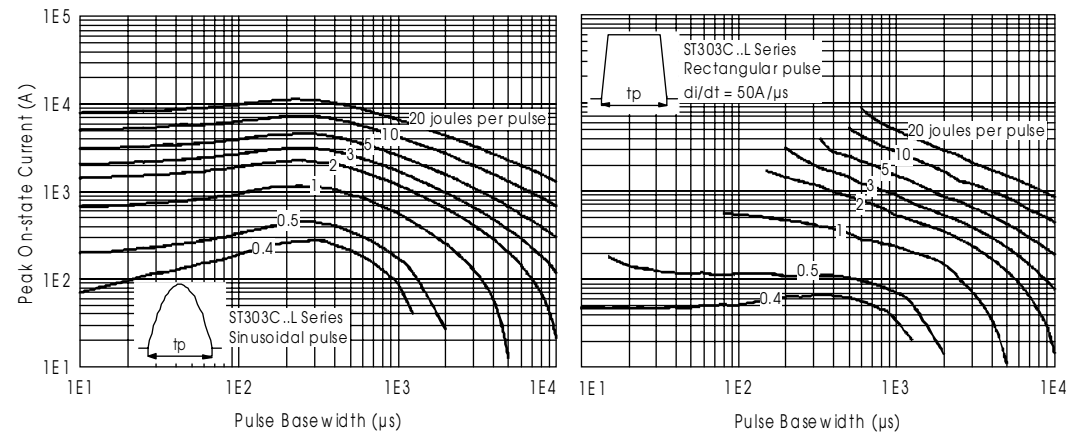


Fig. 16 - Maximum On-state Energy Power Loss Characteristics

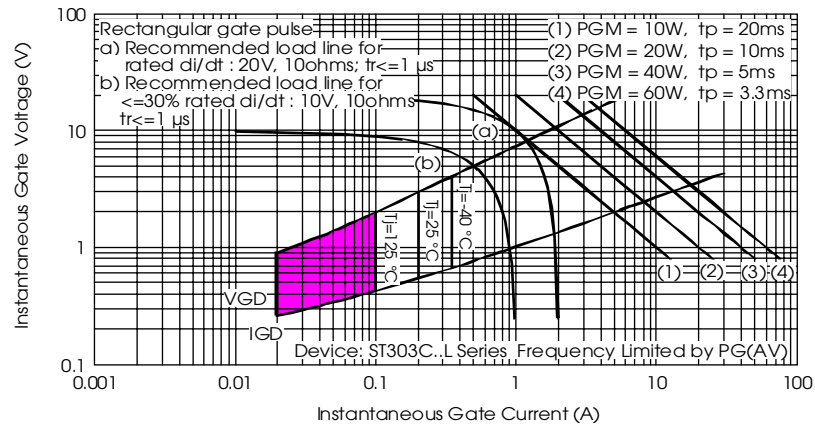


Fig. 17 - Gate Characteristics



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.