

# Wespack Phase Control Thyristor

## Types N2191ML160 to N2191ML180

Development Type No.: NX313ML160-180

### Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
$V_{DRM}$	Repetitive peak off-state voltage, (note 1)	1600-1800	V
$V_{DSM}$	Non-repetitive peak off-state voltage, (note 1)	1600-1800	V
$V_{RRM}$	Repetitive peak reverse voltage, (note 1)	1600-1800	V
$V_{RSM}$	Non-repetitive peak reverse voltage, (note 1)	1500-1900	V

	OTHER RATINGS	MAXIMUM LIMITS	UNITS
$I_{T(AV)M}$	Maximum average on-state current, $T_{sink}=55^{\circ}C$ , (note 2)	2191	A
$I_{T(AV)M}$	Maximum average on-state current. $T_{sink}=85^{\circ}C$ , (note 2)	1476	A
$I_{T(AV)M}$	Maximum average on-state current. $T_{sink}=85^{\circ}C$ , (note 3)	743	A
$I_{T(RMS)M}$	Nominal RMS on-state current, $T_{sink}=25^{\circ}C$ , (note 2)	4366	A
$I_{T(d.c.)}$	D.C. on-state current, $T_{sink}=25^{\circ}C$ , (note 4)	3685	A
$I_{TSM}$	Peak non-repetitive surge $t_p=10ms$ , $V_{rm}=60\%V_{RRM}$ , (note 5)	34.5	kA
$I_{TSM2}$	Peak non-repetitive surge $t_p=10ms$ , $V_{rm}\leq 10V$ , (note 5)	38.0	kA
$I^2t$	$I^2t$ capacity for fusing $t_p=10ms$ , $V_{rm}=60\%V_{RRM}$ , (note 5)	$5.95\times 10^6$	$A^2s$
$I^2t$	$I^2t$ capacity for fusing $t_p=10ms$ , $V_{rm}\leq 10V$ , (note 5)	$7.22\times 10^6$	$A^2s$
$(di/dt)_{cr}$	Critical rate of rise of on-state current (note 6)	(continuous, 50Hz)	100
		(repetitive, 50Hz, 60s)	200
		(non-repetitive)	400
$V_{RGM}$	Peak reverse gate voltage	5	V
$P_{G(AV)}$	Mean forward gate power	4	W
$P_{GM}$	Peak forward gate power	30	W
$T_{j op}$	Operating temperature range	-40 to +125	$^{\circ}C$
$T_{stg}$	Storage temperature range	-40 to +150	$^{\circ}C$

Notes:-

- 1) De-rating factor of 0.13% per  $^{\circ}C$  is applicable for  $T_j$  below  $25^{\circ}C$ .
- 2) Double side cooled, single phase; 50Hz,  $180^{\circ}$  half-sinewave.
- 3) Cathode side cooled, single phase; 50Hz,  $180^{\circ}$  half-sinewave.
- 4) Double side cooled.
- 5) Half-sinewave,  $125^{\circ}C$   $T_j$  initial.
- 6)  $V_D=67\% V_{DRM}$ ,  $I_{TM}=2000A$ ,  $I_{FG}=2A$ ,  $t_r\leq 0.5\mu s$ ,  $T_{case}=125^{\circ}C$ .

### Characteristics

	PARAMETER	MIN.	TYP.	MAX.	TEST CONDITIONS (Note 1)	UNITS
V <sub>TM</sub>	Maximum peak on-state voltage	-	-	1.40	I <sub>TM</sub> =3000A	V
V <sub>TM</sub>	Maximum peak on-state voltage	-	-	2.15	I <sub>TM</sub> =7800A	V
V <sub>T0</sub>	Threshold voltage	-	-	0.940		V
r <sub>T</sub>	Slope resistance	-	-	0.154		mΩ
(dv/dt) <sub>cr</sub>	Critical rate of rise of off-state voltage	1000	-	-	V <sub>D</sub> =80% V <sub>DRM</sub> , linear ramp, gate o/c	V/μs
I <sub>DRM</sub>	Peak off-state current	-	-	100	Rated V <sub>DRM</sub>	mA
I <sub>RRM</sub>	Peak reverse current	-	-	100	Rated V <sub>RRM</sub>	mA
V <sub>GT</sub>	Gate trigger voltage	-	-	3.0	T <sub>j</sub> =25°C      V <sub>D</sub> =10V, I <sub>T</sub> =3A	V
I <sub>GT</sub>	Gate trigger current	-	-	300		mA
V <sub>GD</sub>	Gate non-trigger voltage	-	-	0.25		Rated V <sub>DRM</sub>
I <sub>H</sub>	Holding current	-	-	1000	T <sub>j</sub> =25°C	mA
t <sub>gd</sub>	Gate-controlled turn-on delay time	-	0.8	2.0	V <sub>D</sub> =67% V <sub>DRM</sub> , I <sub>T</sub> =2000A, di/dt=10A/μs, I <sub>FG</sub> =2A, t <sub>r</sub> =0.5μs, T <sub>j</sub> =25°C	μs
t <sub>gt</sub>	Turn-on time	-	1.4	3.0		μs
Q <sub>rr</sub>	Recovered charge	-	3600	3900	I <sub>TM</sub> =1000A, t <sub>p</sub> =1000μs, di/dt=10A/μs, V <sub>r</sub> =50V	μC
Q <sub>ra</sub>	Recovered charge, 50% Chord	-	2150	-		μC
I <sub>rr</sub>	Reverse recovery current	-	150	-		A
t <sub>rr</sub>	Reverse recovery time	-	29	-		μs
t <sub>q</sub>	Turn-off time	-	350	-	I <sub>TM</sub> =1000A, t <sub>p</sub> =1000μs, di/dt=10A/μs, V <sub>r</sub> =50V, V <sub>dr</sub> =80%V <sub>DRM</sub> , dV <sub>dr</sub> /dt=20V/μs	μs
		-	600	-	I <sub>TM</sub> =1000A, t <sub>p</sub> =1000μs, di/dt=10A/μs, V <sub>r</sub> =50V, V <sub>dr</sub> =80%V <sub>DRM</sub> , dV <sub>dr</sub> /dt=200V/μs	
R <sub>thJK</sub>	Thermal resistance, junction to heatsink	-	-	0.018	Double side cooled	K/W
		-	-	0.033	Anode side cooled	K/W
		-	-	0.044	Cathode side cooled	K/W
F	Mounting force	25	-	31	Note 2.	kN
W <sub>t</sub>	Weight	-	550	-		g

Notes:-

- 1) Unless otherwise indicated T<sub>j</sub>=125°C.
- 2) For other clamp forces, please consult factory.

**Curves**

Figure 1 – On-state characteristics of Limit device

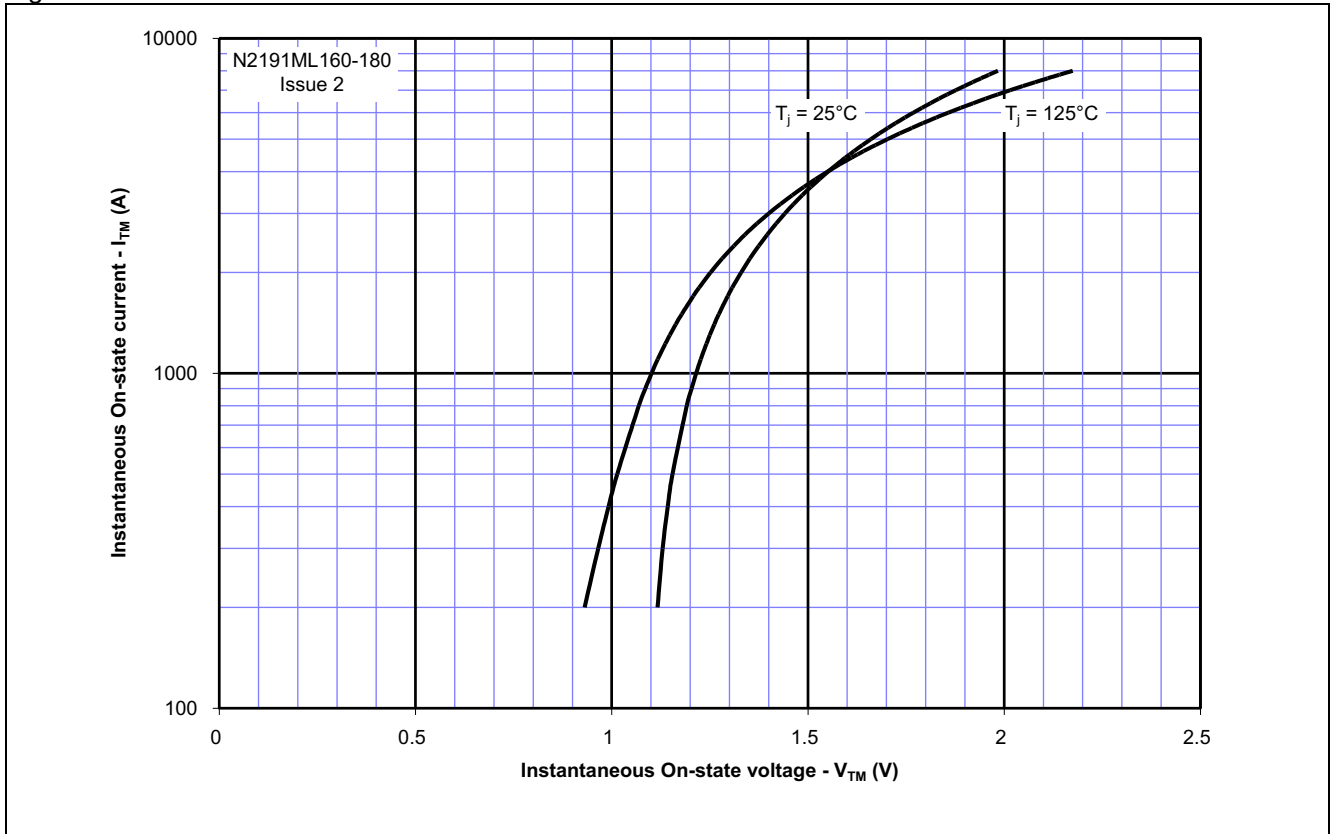


Figure 2 – Transient thermal impedance

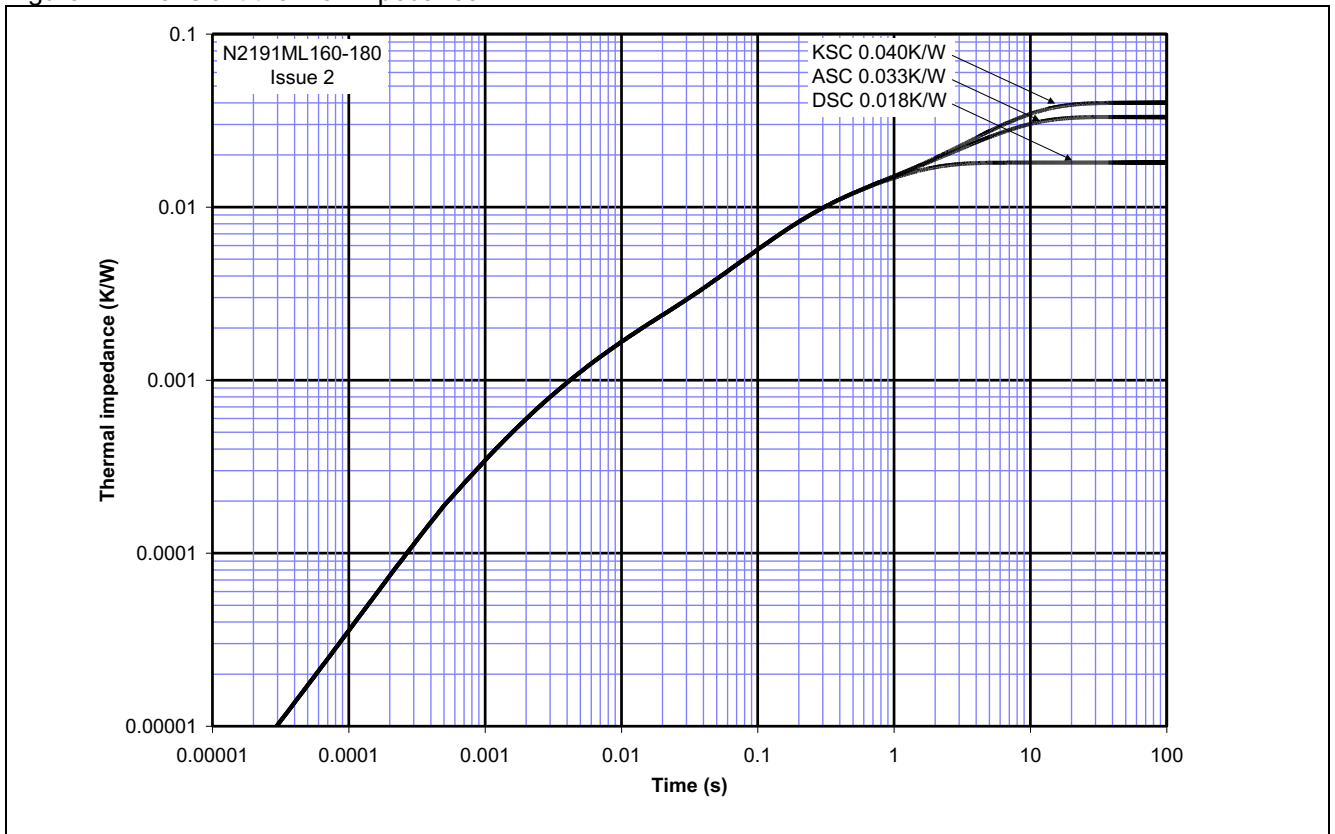
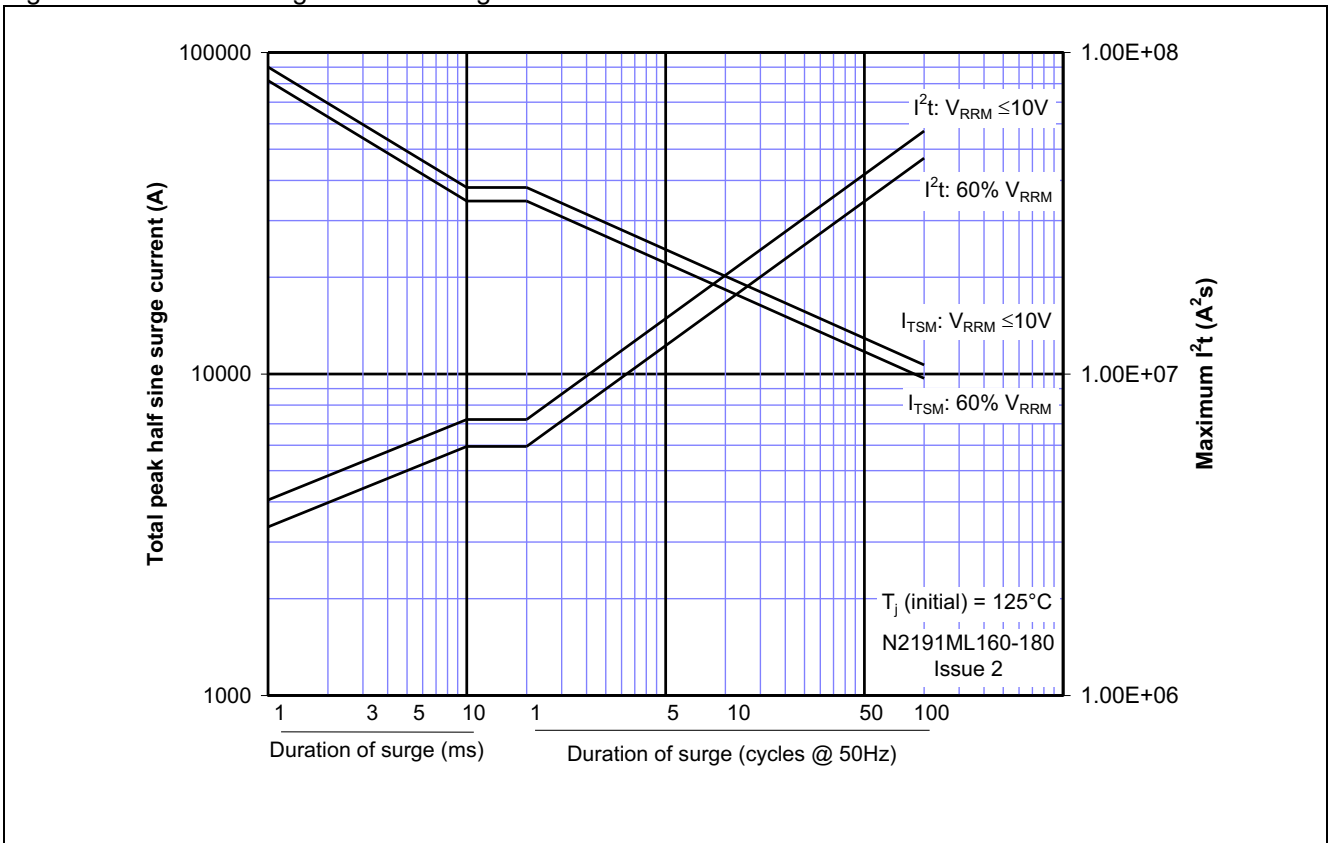
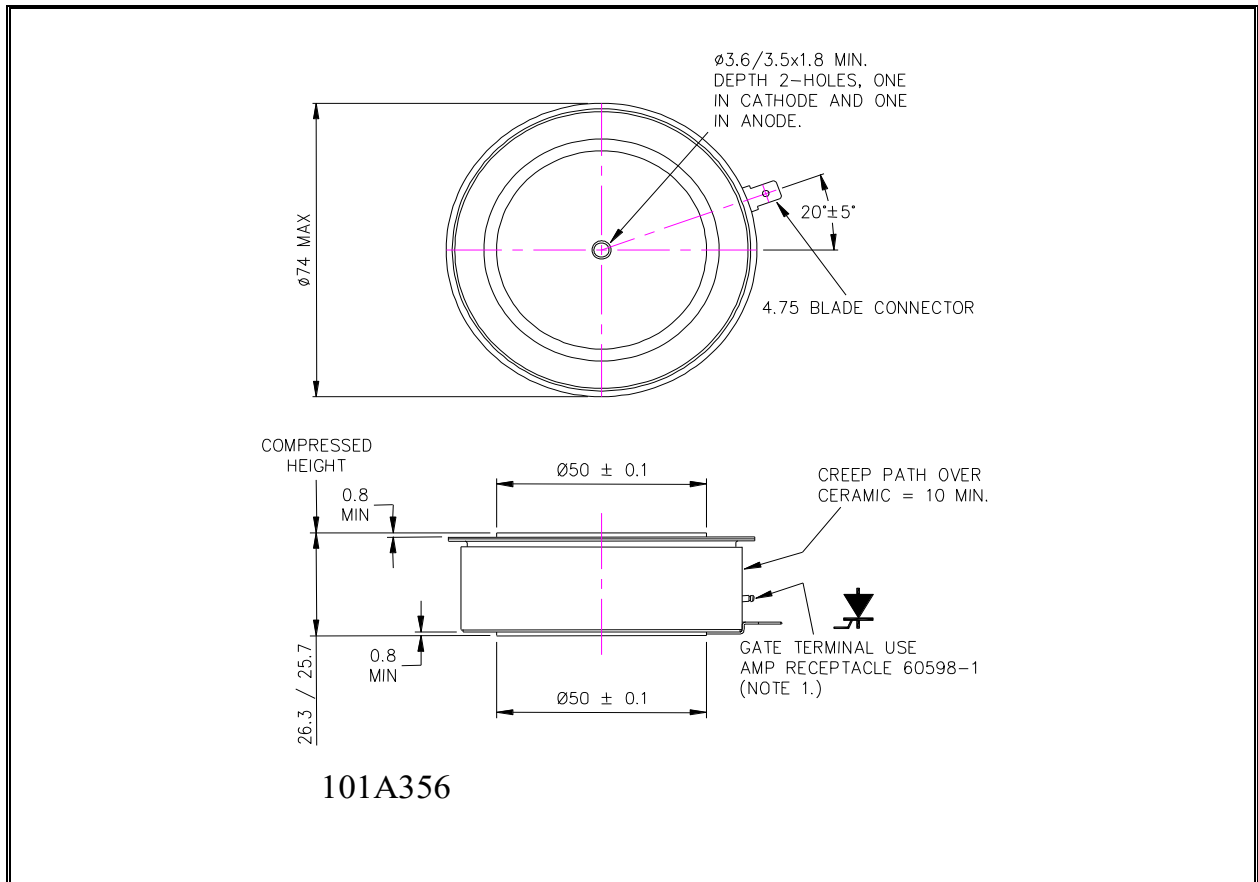


Figure 3 – Maximum surge and I<sup>2</sup>t Ratings



**Outline Drawing & Ordering Information**



**ORDERING INFORMATION**

(Please quote 10 digit code as below)

<b>N2191</b>	<b>ML</b>	<b>◆◆</b>	<b>0</b>
Fixed Type Code	Fixed outline code	Voltage code $V_{DRM}/100$ 16-18	Fixed turn-off time code

Order code: N2191ML160 – 1600V  $V_{DRM}$ ,  $V_{RRM}$ , 26mm clamp height capsule.

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