

# Wespack Phase Control Thyristor

## Types N2191ML160 to N2191ML180

Development Type No.: NX313ML160-180

### Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V <sub>DRM</sub>	Repetitive peak off-state voltage, (note 1)	1600-1800	V
V <sub>DSM</sub>	Non-repetitive peak off-state voltage, (note 1)	1600-1800	V
V <sub>RRM</sub>	Repetitive peak reverse voltage, (note 1)	1600-1800	V
V <sub>RSM</sub>	Non-repetitive peak reverse voltage, (note 1)	1500-1900	V

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

Notes:-

- 1) De-rating factor of 0.13% per °C is applicable for T<sub>j</sub> below 25°C.
- 2) Double side cooled, single phase; 50Hz, 180° half-sinewave.
- 3) Cathode side cooled, single phase; 50Hz, 180° half-sinewave.
- 4) Double side cooled.
- 5) Half-sinewave, 125°C T<sub>j</sub> initial.
- 6) V<sub>D</sub>=67% V<sub>DRM</sub>, I<sub>TM</sub>=2000A, I<sub>FG</sub>=2A, t<sub>r</sub>≤0.5µs, T<sub>case</sub>=125°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>RDM</sub>	Peak reverse current	-	-	100	Rated V <sub>RDM</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

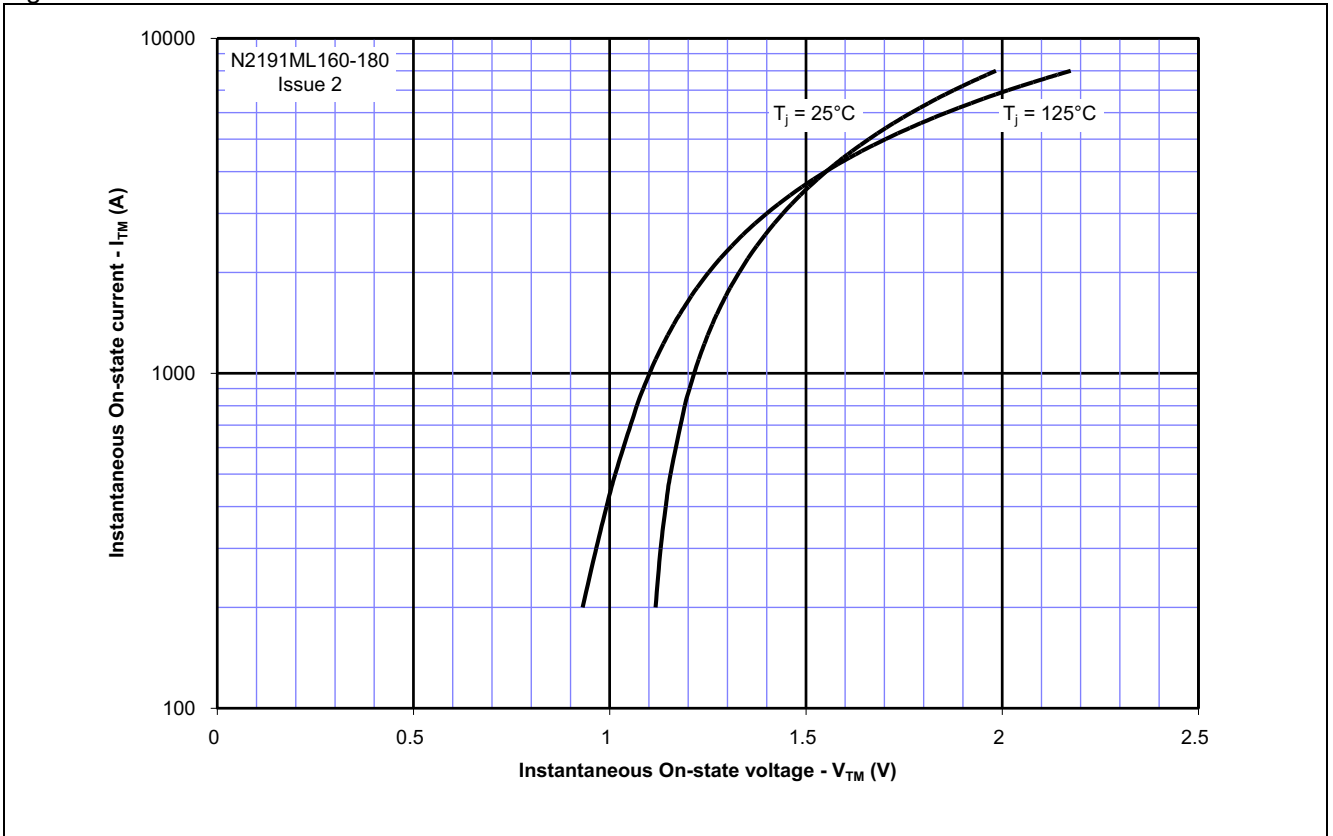


Figure 2 – Transient thermal impedance

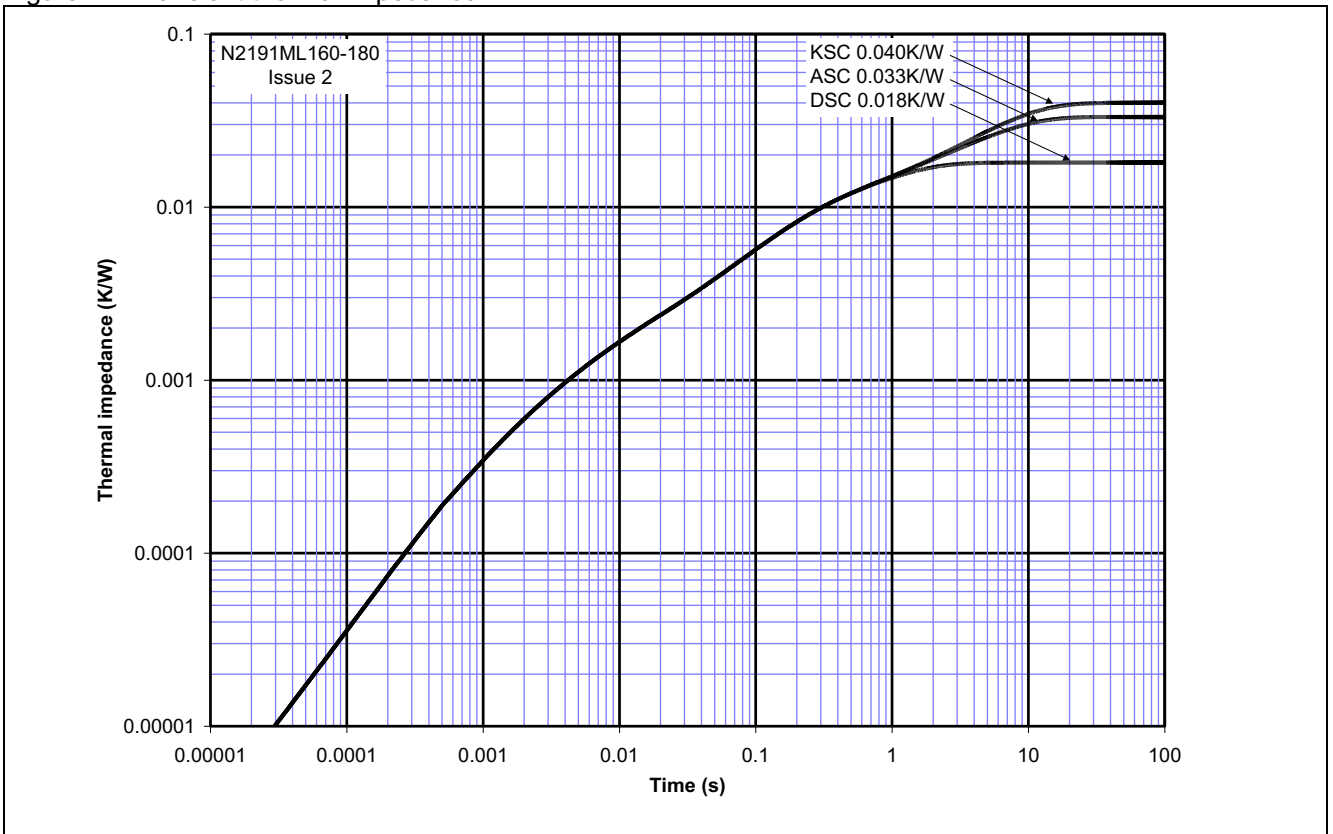
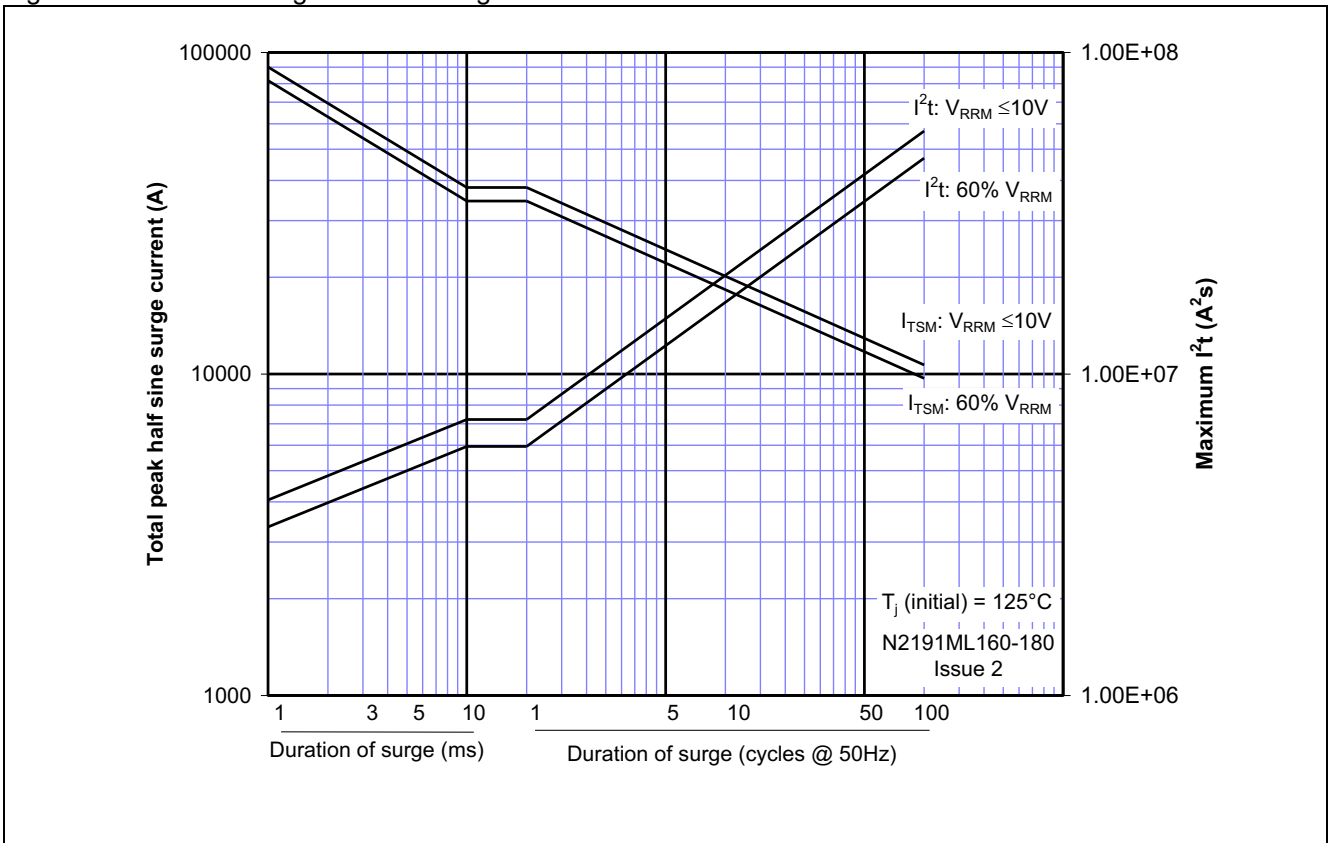
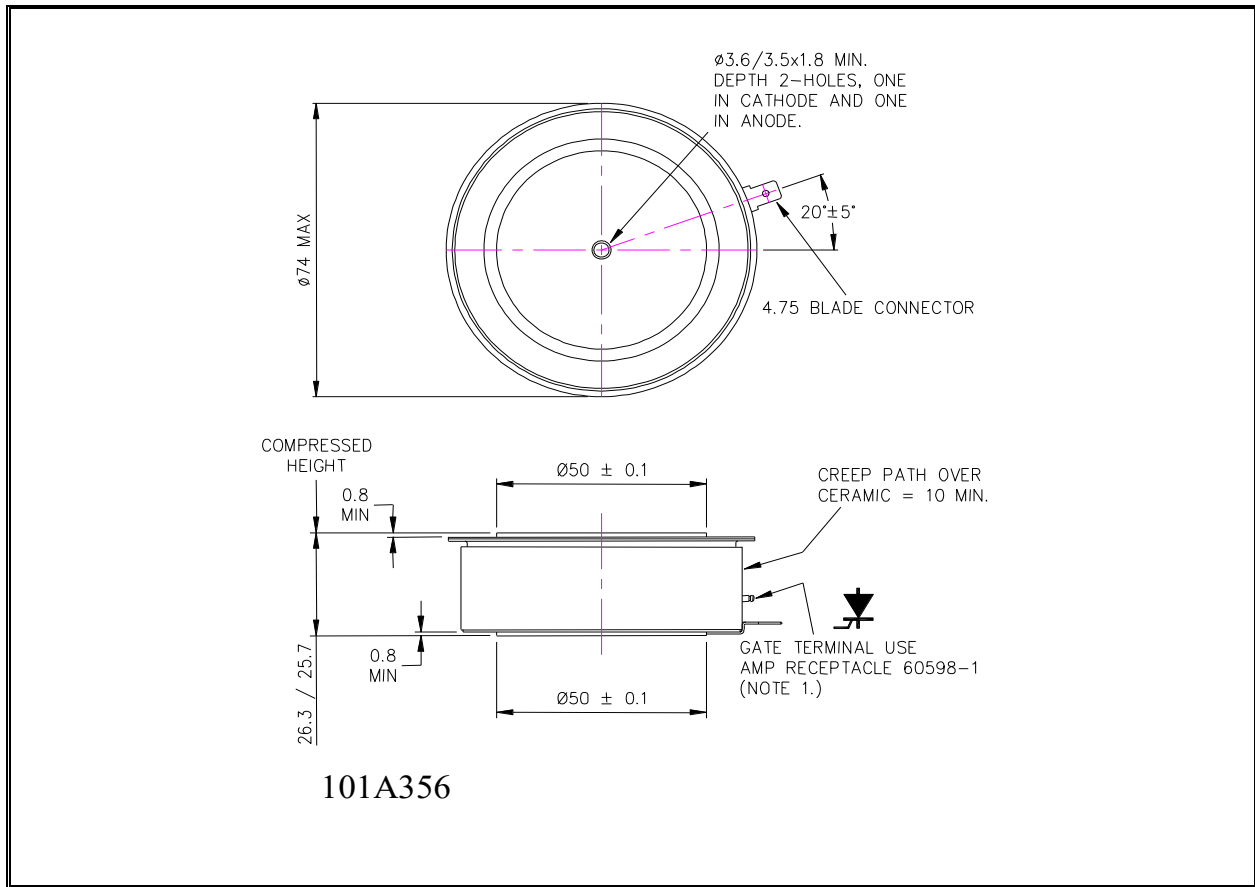


Figure 3 – Maximum surge and I<sup>2</sup>t Ratings



**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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