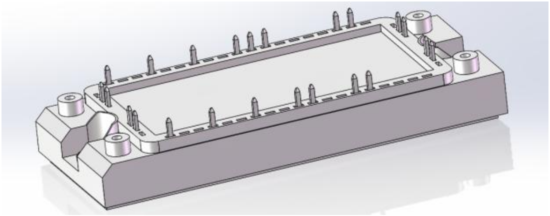
JLPI50B120RN2E7SN

LN2 PACK module with NCE Gen.7 Trench/Fieldstop IGBT and Emitter Controlled diode and NTC

Features

- Electrical features

- VCES = 1200 V
- IC nom = 50 A / ICRM = 100 A
- Low V_{CEsat}
- Overload operation up to 175℃

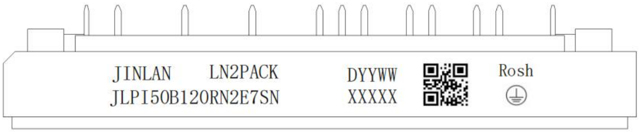


LN2 Pack

- Mechanical features

- High power and thermal cycling capability
- Integrated NTC temperature sensor
- Copper base plate
- Al_2O_3 substrate with low thermal resistance

MARKING DIAGRAM

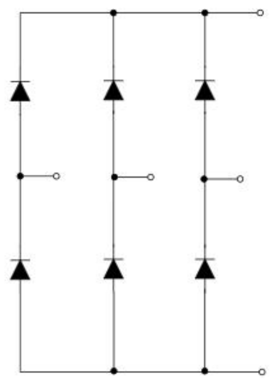


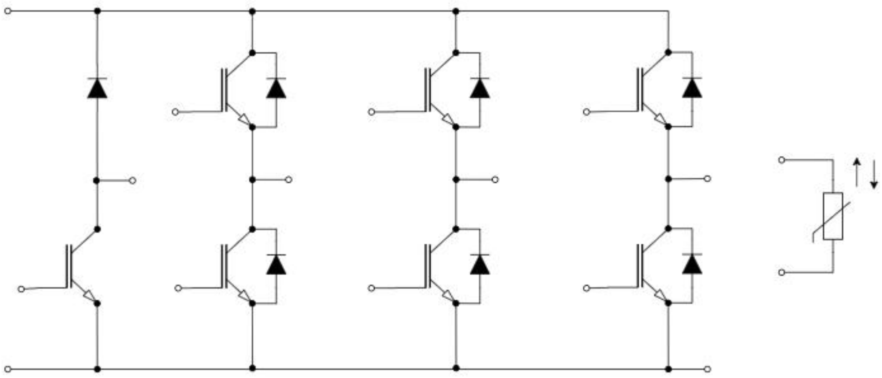
JINLAN = Company Name
JLPI50B120RN2E7SN = Specific Device Code
YYWW = Year and Work Week Code
XXXXX = Serial Number
QR code = Custom Assembly Information

Typical Applications

- Auxiliary inverters
- Motor drives
- Servo drives

Description





Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS,f=50Hz,t=60s	2.5	kV
Internal isolation		basic insulation(class 1,IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	10.0	mm
Clearance	d_{clear}	terminal to heatsink	7.5	mm
Comparative tracking index (electrical)	CTI		>200	
RTI Elec.	RTI	housing	140	℃

Package Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray Inductance	L_{CE}		--	35	--	nH
Module Lead Resistance, Terminal to Chip	$R_{AA'+CC'}$	T_C=25℃, per switch	--	6.9	--	mΩ
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$	T_C=25℃, per switch	--	5.9	--	mΩ
Storage Temperature Range	T_{STG}		-40		125	℃
Mounting Torque, Screw M5	M	M5, Screw	3		6	N.m
Weight	G		--	180	--	g

IGBT, Inverter

Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_C	Collector Current @ T_C=25℃	100	A
	Collector Current @ T_C=80℃	50	A
I_{CM}	Pulsed Collector Current，t_p=1S	150	A

Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 50 A, T_{vj} = 25°C	--	1.80	2.20	V
		V_{GE} = 15 V, I_C = 50 A, T_{vj} = 125°C	--	1.95	--	
		V_{GE} = 15 V, I_C = 50 A, T_{vj} = 150°C	--	2.00	--	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	V_{GE} = V_{CE} , I_C = 1 mA,T_{vj} = 25°C	5.0	6.0	7.0	V
I_{CES}	Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} =V_{CES} ,T_{vj} = 25°C	--	--	200	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = V_{GES} , V_{CE} = 0 V，T_{vj} = 25°C	--	--	200	nA
R_{Gint}	Internal Gate Resistance		--	1.27	--	Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V	--	5.07	--	nF
C_{res}	Reverse Transfer		--	0.13	--	nF
Q_G	Gate Charge	V_{GE}=15V, I_C=50A	--	0.19	--	μC
$t_{d(on)}$	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω ,V_{GE} =±15V Inductive Load T_{vj} = 25°C	--	110	--	ns
t_r	Rise Time		--	30	--	
$t_{d(off)}$	Turn−off Delay Time		--	180	--	
t_f	Fall Time		--	190	--	
E_{on}	Turn−On Switching Loss per Pulse		--	2.83	--	mJ
E_{off}	Turn Off Switching Loss per Pulse		--	4.42	--	
$t_{d(on)}$	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω ,V_{GE} =±15V Inductive Load T_{vj} = 125°C	--	120	--	ns
t_r	Rise Time		--	30	--	
$t_{d(off)}$	Turn−off Delay Time		--	230	--	
t_f	Fall Time		--	340	--	
E_{on}	Turn−on Switching Loss per Pulse		--	4.16	--	mJ
E_{off}	Turn Off Switching Loss per Pulse		--	5.24	--	
$t_{d(on)}$	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω ,V_{GE} =±15V Inductive Load T_{vj} = 150°C	--	110	--	ns
t_r	Rise Time		--	40	--	
$t_{d(off)}$	Turn−off Delay Time		--	240	--	
t_f	Fall Time		--	330	--	
E_{on}	Turn−on Switching Loss per Pulse		--	4.87	--	mJ
E_{off}	Turn Off Switching Loss per Pulse		--	5.49	--	
I_{SC}	SC Data	t_P≤10μs,V_{GE}≤15V, T_{vj}=150℃,V_{CC}=800V, V_{CEmax}=V_{CES} -L_{sCE}·di/dt	--	130	--	A
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)	--	0.59	--	K/W
$T_{vj\,op}$		Temperature under switching conditions	-40		175[1]	℃

[1] $T_{vj\,op}$ > 150℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Diode, Inverter

Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	150	A

Characteristics （Tc=25℃ unless otherwise noted）

V_F	Diode Forward Voltage	I_F=50A	T_j=25°C		1.80	2.70	V
			T_j=175°C		1.75		
Q_r	Recovered Charge	I_F=50A,R_g=25Ω, T_j=25°C			1.06		μC
I_{RM}	Peak Reverse Recovery Current				39.5		A
T_{rr}	Reverse Recovery Time				126		ns
E_{rec}	Reverse Recovery Energy				0.44		mJ
Q_r	Recovered Charge	I_F=50A,R_g=25Ω, T_j=175°C			TBD		μC
I_{RM}	Peak Reverse Recovery Current				TBD		A
T_{rr}	Reverse Recovery Time				TBD		ns
E_{rec}	Reverse Recovery Energy				TBD		mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)			0.84		K/W
$T_{vj\,op}$		Temperature under switching conditions		-40		175[2]	℃

[2] $T_{vj\,op}$ > 150℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Diode, Rectifier

Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1600	V
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	100	A

Characteristics （Tc=25℃ unless otherwise noted）

V_F	Diode Forward Voltage	I_F = 50 A, T_j = 150 °C		1.0		V
I_R	Reverse Current	T_j=175 °C, V_R=1600V		3		mA
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)		0.65		K/W
$T_{vj\,op}$		Temperature under switching conditions	-40		175[3]	℃

[3] $T_{vj\,op}$ > 150℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

IGBT, Chopper

Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_C	Collector Current @ T_C=25℃	100	A
	Collector Current @ T_C=80℃	35	A
I_{CM}	Pulsed Collector Current，t_p=1S	105	A

Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	I_C=35A，V_{GE}=15V	T_{vj}=25°C		1.50	2.10	V
			T_{vj}= 175 °C		1.75		
$V_{GE(th)}$	Gate Threshold Voltage	I_C=1mA,V_{CE}=V_{GE}		5.5	--	7.0	V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V,V_{CE}=1200V		--	--	10	uA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=30V,V_{CE}=0V		--	--	100	nA
R_{Gint}	Internal Gate Resistance	f=1MHz		--	0.6	--	Ω
C_{ies}	Input Capacitance	V_{CE}=25V,V_{GE}=0V, f=1MHz		3500	4203	4900	nF
C_{oes}	Out Capacitance			--	107	--	nF
C_{res}	Reverse Transfer			--	24	--	nF
Q_G	Gate Charge	V_{CE}=960V, I_C=35A,V_{GE}=15V		--	147	--	μC
$t_{d(on)}$	Turn−On Delay Time	V_{CE}=600V,I_C=35A, V_{GE}=0/15V, R_g=25Ω, Inductive Load			71		ns
t_r	Rise Time				53		
$t_{d(off)}$	Turn−off Delay Time				261		
t_f	Fall Time				66.3		
E_{on}	Turn−On Switching Loss per Pulse				2.34		mJ
E_{off}	Turn Off Switching Loss per Pulse				1.44		
$t_{d(on)}$	Turn−On Delay Time	V_{CE}=600V,I_C=35A, V_{GE}=0/15V,R_g=25Ω, Inductive Load, T_j=175°C			TBD		ns
t_r	Rise Time				TBD		
$t_{d(off)}$	Turn−off Delay Time				TBD		
t_f	Fall Time				TBD		
E_{on}	Turn−on Switching Loss per Pulse				3.64		mJ
E_{off}	Turn Off Switching Loss per Pulse				2.00		
I_{SC}	SC Data	V_{GE}=15V,V_{CC}≤600V, t_{SC}≤10us,T_j≤150°C		--	175	--	A
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)			0.67		K/W
$T_{vj\ op}$		Temperature under switching conditions		-40		175[4]	℃

[4] $T_{vj\ op}$ > 150℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Diode, Chopper

Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	25	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	50	A

Characteristics （Tc=25℃ unless otherwise noted）

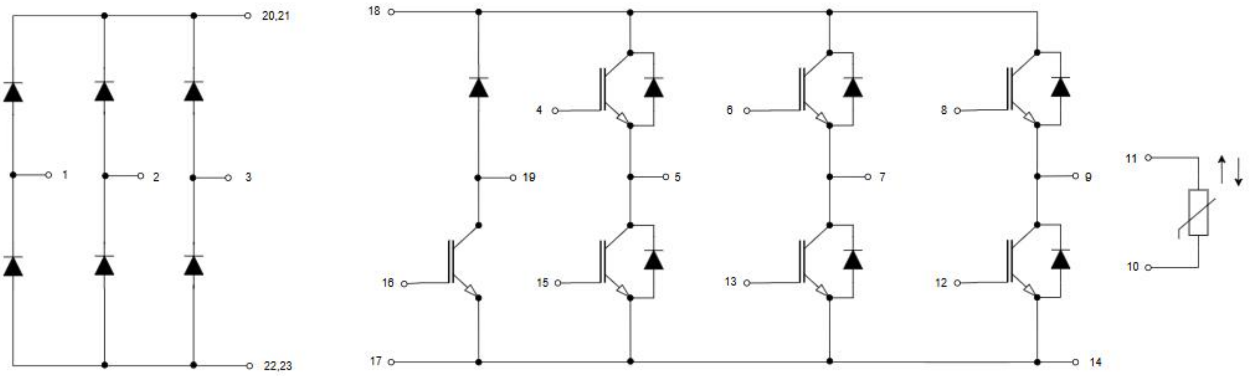
V_F	Diode Forward Voltage	I_F=25A	T_j=25°C		1.70	2.50	V
			T_j=175°C		1.65		
Q_r	Recovered Charge	I_F=25A,R_g=25Ω, T_j=25°C			0.47		µC
I_{RM}	Peak Reverse Recovery Current				18.2		A
T_{rr}	Reverse Recovery Time				58		ns
E_{rec}	Reverse Recovery Energy				0.19		mJ
Q_r	Recovered Charge	I_F=25A,R_g=25Ω, T_j=175°C			TBD		µC
I_{RM}	Peak Reverse Recovery Current				TBD		A
T_{rr}	Reverse Recovery Time				TBD		ns
E_{rec}	Reverse Recovery Energy				TBD		mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)			0.95		K/W
$T_{vj\,op}$		Temperature under switching conditions		-40		175[5]	℃

[5] $T_{vj\,op}$ > 150℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

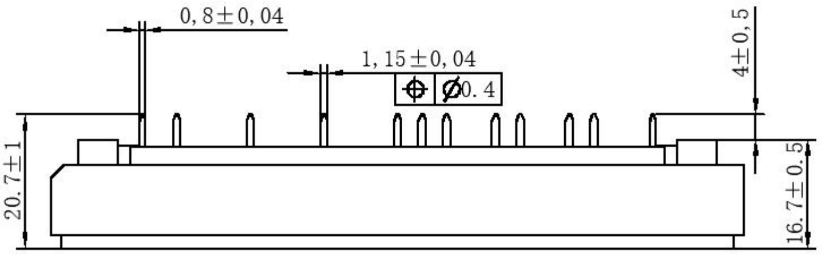
NTC Characteristics (Tc = 25°C unless otherwise noted)

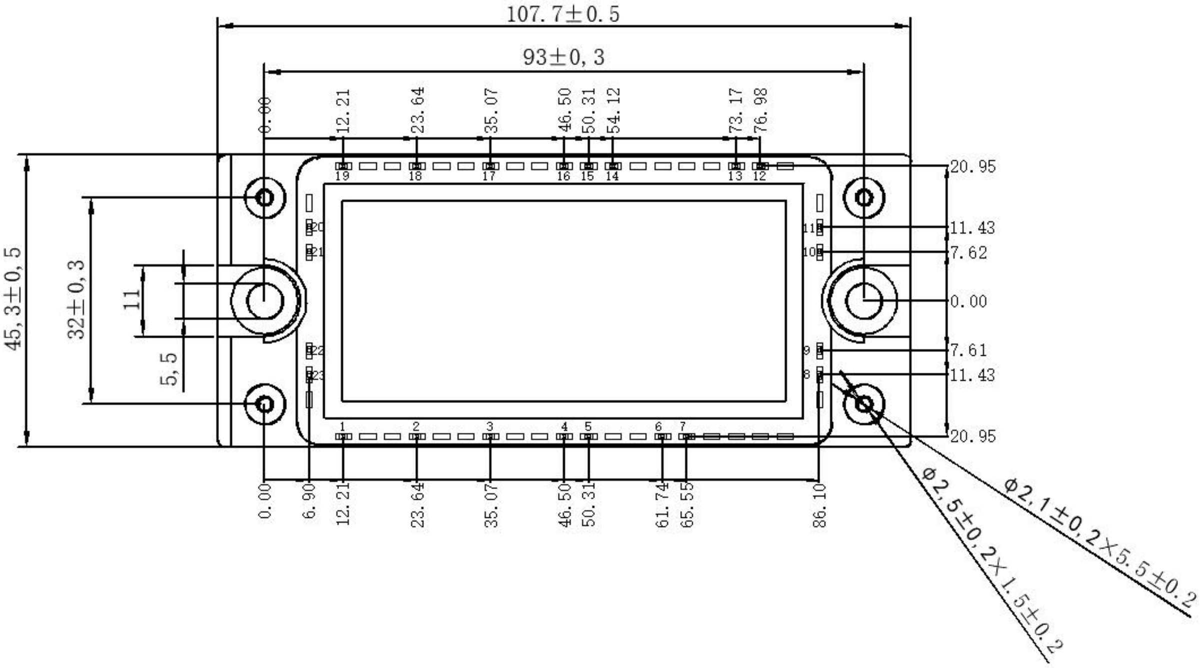
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R_{25}	Rated Resistance		--	5.0	--	kΩ
ΔR/R	Deviation of R100	T_C=100 ℃,R_{100}=493.3Ω	-5	--	5	%
P_{25}	Power Dissipation		--	--	20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$	--	3375	--	K
$B_{25/80}$	B-value	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$	--	3411	--	K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$	--	3433	--	K

CIRCUIT DIAGRAM



PACKAGE DIMENSION





REVISION HISTORY

Document version	**Date of release**	**Description of changes**
Rev.00	2024-08-23	Preview
Rev.01	2024-12-11	IGBT (inverter) $V_{CE(sat)}$ updated

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