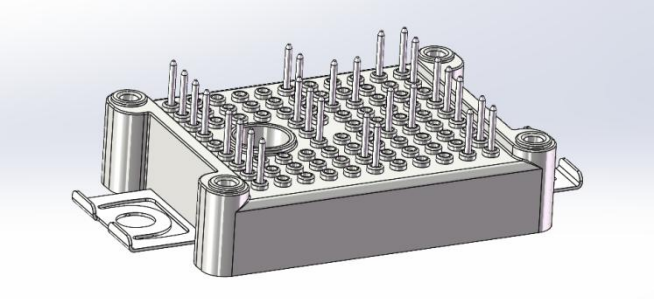
JLCD75B120RE1H7SN

LE1 PACK module with Trench/Fieldstop IGBT and Emitter Controlled diode and NTC

RoHS

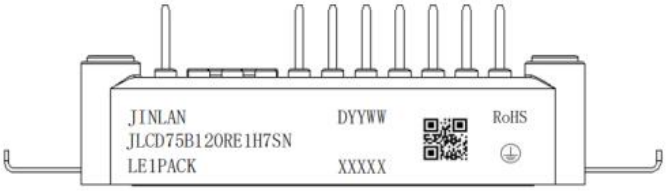
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Low inductance case
- Al_2O_3 substrate with low thermal resistance
- Solder Contact Technology



LE1 Pack

MARKING DIAGRAM

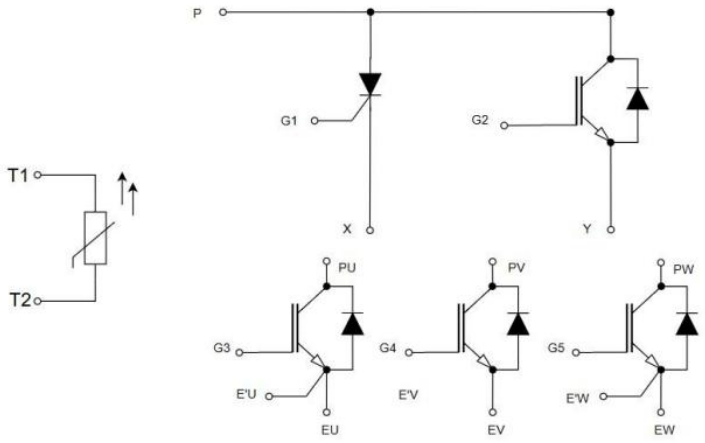


JINLAN	= Company Name
JLCD75B120RE1H7SN	= Specific Device Code
YYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly

Typical Applications

- Air Conditioning
- Motor Drives
- Servo Drives
- UPS Systems
- Auxiliary inverters

Description



Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS,f = 50Hz,t =60 s	2.5	kV
Internal isolation		basic insulation(class 1,IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	11.5	mm
Creepage distance	d_{creep}	terminal to terminal	6.3	mm
Clearance	d_{clear}	terminal to heatsink	10	mm
Clearance	d_{clear}	terminal to terminal	5	mm
Comparative tracking index (electrical)	CTI		>200	
RTI Elec.	RTI	housing	140	°C

Package Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray Inductance	L_{CE}		--	25	--	nH
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$		--	4.5	--	mΩ
Storage temperature	T_{stg}		-40	--	125	°C
Mounting force per clamp	F		20	--	50	N
Weight	G		--	24	--	g

SCR (T1)

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

Symbol	Description		Value	Unit
V_{DRM}	repetitive peak off-state voltage		1200	V
V_{DSM}	non-repetitive peak off-state voltage		1300	V
V_{RRM}	repetitive peak reverse voltage		1200	V
V_{RSM}	non-repetitive peak reverse voltage		1300	V
$IT_{(AV)}$	average on-state current	half sine wave	50	A
$IT_{(RMS)}$	RMS on-state current	half sine wave	79	A
I_{TSM}	non-repetitive peak on- state current	half sine wave; Tj(init) = 25℃; tp = 10 ms	700	A
		half sine wave; Tj(init) = 25℃; tp = 8.3 ms	770	
I^2t	I^2t for fusing	tp = 10 ms; sine-wave pulse	2450	A2 s
dI_T/dt	rate of rise of on-state current	I_G = 200 mA	150	A/μs
I_{GM}	peak gate current		8	A
V_{GM}	peak gate voltage		5	V
P_{GM}	peak gate power		20	W
$P_{G(AV)}$	average gate power	over any 20 ms period	1	W

Characteristics （T_c=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25℃	--	--	50	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T_j = 25℃	--	--	300	mA
I_H	holding current	V_D = 12 V; T_j = 25℃	--	--	200	mA
V_T	on-state voltage	I_T = 50 A; T_j = 25℃			1.3	V
		I_T = 50 A; T_j = 150℃			1.2	
V_o	threshold voltage	For power-loss calculations only; T_j= 150℃	--	--	975	mV
R_s	dynamic resistance		--	--	4.4	mΩ
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25℃	--	0.7	1	V
		V_D = 800 V; I_T = 0.1 A; T_j = 125℃	0.25	0.4	--	V
I_D	off-state current	V_D = 1200 V; Tj = 25℃	--	--	10	μA
		V_D = 1200 V; T_j = 150℃	--	--	5	mA
I_R	reverse current	V_D = 1200 V; T_j = 25℃	--	--	10	μA
		V_D = 1200 V; T_j = 150℃	--	--	5	mA
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 804 V; R_{GK} = 100 Ω;T_j = 125℃; exponential waveform	1500	--	--	V/μs
		V_{DM} = 804 V; R_{GK} = 100 Ω;T_j = 150℃; exponential waveform	1000	--	--	V/μs
t_{gt}	gate-controlled turn-on time	I_{TM} = 40 A; V_D = 800 V; I_G = 0.1 A; dI_G/dt = 5 A/μs; T_j = 25℃	--	2	--	ns
t_q	commutated turn-off time	V_{DM} = 804 V; T_j = 125 °C; I_{TM} = 20 A; V_R = 25 V; $(dIT/dt)_M$= 30 A/μs; dV_D/dt = 50 V/μs; $R_{GK(ext)}$ = 100 kΩ; (V_{DM} = 67% of V_{DRM})	--	150	--	ns
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)	--	0.335	--	K/W
$T_{vj\ op}$		Temperature under switching conditions	-40		150[1)]	°C

IGBT(T2)

Absolute Maximum Ratings (T_c = 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℃	150	A
	Collector Current @ T_C=100℃	75	A
I_{CM}	Pulsed Collector Current，t_p limited by $T_{vj\,max}$	225	A
P_{tot}	Total power dissipation,T_c = 25 °C , T_{vjmax} = 175°C	355	W

Characteristics （T_c=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	V_{GE} = 15 V, IC = 75 A, T_{vj} = 25°C	--	1.65	2.50	V
		V_{GE} = 15 V, IC = 75 A, T_{vj} = 125°C	--	1.75	--	
		V_{GE} = 15 V, IC = 75 A, T_{vj} = 150°C	--	1.85	--	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	I_C = 3 mA,V_{CE} = V_{GE}	5.0	6.0	7.0	V
I_{CES}	Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} = 1200V	--	--	100	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = ±30 V, V_{CE} = 0 V	--	--	200	nA
R_{Gint}	Internal Gate Resistance	f = 1MHz	--	0.5	--	Ω
C_{ies}	Input Capacitance	V_{CE} = 25V,V_{GE} = 0V, f = 1MHz	--	7.7	--	nF
C_{res}	Reverse Transfer		--	0.04	--	nF
Q_G	Gate Charge	V_{CE} = 600 V, I_C = 75 A V_{GE} = ±15 V	--	0.36	--	μC
$t_{d(on)}$	Turn−On Delay Time	V_{CC} = 600 V, I_C = 75 A R_{Gon} =25Ω,R_{Goff} = 25 Ω V_{GE} = ±15 V Inductive Load T_{vj} = 25 °C	--	180	--	ns
t_r	Rise Time		--	80	--	
$t_{d(off)}$	Turn−off Delay Time		--	350	--	
t_f	Fall Time		--	210	--	
E_{on}	Turn−On Switching Loss per Pulse		--	15.48	--	mJ
E_{off}	Turn Off Switching Loss per Pulse		--	5.75	--	
$t_{d(on)}$	Turn−On Delay Time	V_{CC} = 600 V, I_C = 75 A R_{Gon} =25 Ω,R_{Goff} =25 Ω V_{GE} = ±15V Inductive Load T_{vj} = 100 °C	--	180	--	ns
t_r	Rise Time		--	80	--	
$t_{d(off)}$	Turn−off Delay Time		--	390	--	
t_f	Fall Time		--	250	--	
E_{on}	Turn−On Switching Loss per Pulse		--	17.54	--	mJ
E_{off}	Turn Off Switching Loss per Pulse		--	6.77	--	
$I_{c(sc)}$	SC Data	t_P ≤ 10 μs,V_{GE} ≤ 15 V T_{vj} ≤ 150 ℃,V_{CC} = 800 V V_{CEmax} = V_{CES} -L_{sCE}·di/dt	--	330	--	A
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)		0.31		K/W
$T_{vj\,op}$		Temperature under switching conditions	-40		175[1)]	°C

[1)] $T_{vj\,op}$ > 150°C is only allowed for operation at overload conditions.

Diode(D2)

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	75	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	225	A

Characteristics （Tc=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F = 75 A, V_{GE} = 0 V， T_{vj} = 25°C	--	2.10	2.90	V
		I_F = 75 A, V_{GE}=0 V， T_{vj} =125°C	--	1.90	--	
		I_F = 75A, V_{GE} = 0 V， T_{vj} = 175°C	--	1.80	--	
Q_r	Recovered Charge	V_R = 600 V,I_F = 75 A V_{GE} = -15 V T_{vj} =25 °C	--	2.31	--	µC
I_{RM}	Peak Reverse Recovery Current		--	35.7	--	A
T_{rr}	Reverse Recovery Time		--	680	--	ns
E_{rec}	Reverse Recovery Energy		--	3.12	--	mJ
Q_r	Recovered Charge	V_R = 600 V,I_F = 75 A V_{GE} = -15 V T_{vj} =100 °C	--	2.56	--	µC
I_{RM}	Peak Reverse Recovery Current		--	37.8	--	A
T_{rr}	Reverse Recovery Time		--	850	--	ns
E_{rec}	Reverse Recovery Energy		--	4.77	--	mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	0.59	--	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40	--	175[2)]	°C

[2)] $T_{vj\ op}$ > 150°C is only allowed for operation at overload conditions.

IGBT(T3,T4,T5)

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

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_{CDC}	Collector Current @ T_C=25℃	70	A
	Collector Current @ T_C=100℃	35	A
I_{CM}	Pulsed Collector Current，t_p limited by $T_{vj\ max}$	70	A
P_D	Power Dissipation @ T_C = 25°C	258	W
	Power Dissipation @T_C = 100 °C	129	W

Characteristics （T_c=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 35 A, T_{vj} = 25°C	--	1.60	2.10	V
		V_{GE} = 15 V, I_C = 35 A, T_{vj} = 125°C	--	1.75	--	
		V_{GE} = 15 V, I_C = 35 A, T_{vj} = 150°C	--	1.80	--	
$V_{GE(TH)}$	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
RGint	Internal Gate Resistance	f=1MHz	--	1.34	--	Ω
Cies	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V	--	4140	--	pF
Cres	Reverse Transfer		--	36.5	--	pF
Q_G	Gate Charge	V_{GE}= 15V, I_C=35A	--	0.15	--	μC
td(on)	Turn−On Delay Time	V_{CE} = 600 V,I_C = 35 A, R_G = 10Ω,$V_{GE(on)}$ =15V,$V_{GE(off)}$ =−5V, T_{vj} = 25°C	--	90	--	ns
tr	Rise Time		--	216	--	
td(off)	Turn−off Delay Time		--	176	--	
tf	Fall Time		--	92	--	
Eon	Turn−On Switching Loss per Pulse		--	1.83	--	mJ
Eoff	Turn Off Switching Loss per Pulse		--	2.55	--	
td(on)	Turn−On Delay Time	V_{CE} = 600 V,I_C = 35 A, R_G = 10Ω,$V_{GE(on)}$ =15V,$V_{GE(off)}$ =−5V, T_{vj} = 150°C	--	95	--	ns
tr	Rise Time		--	264	--	
td(off)	Turn−off Delay Time		--	212	--	
tf	Fall Time		--	163	--	
Eon	Turn−on Switching Loss per Pulse		--	2.65	--	mJ
Eoff	Turn Off Switching Loss per Pulse		--	3.68	--	
I_{SC}	Short circuit collector current	t_P≤10μs,V_{GE} =15V, T_{vj} =150℃,V_{CC}≤800V,	--	110	--	A
T_{sc}	Short circuit time	V_{GE} =16V, T_{vj} =150℃,V_{CC}≤800V	6	--	--	μS
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)	--	0.58		K/W
$T_{vj\ op}$	Temperature under switching conditions		-40	--	175[3)]	°C

[3)] $T_{vj\ op}$ > 150°C is only allowed for operation at overload conditions.

Diode(D3,D4,D5)

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

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	35	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	70	A

Characteristics （T_c=25℃ unless otherwise noted）

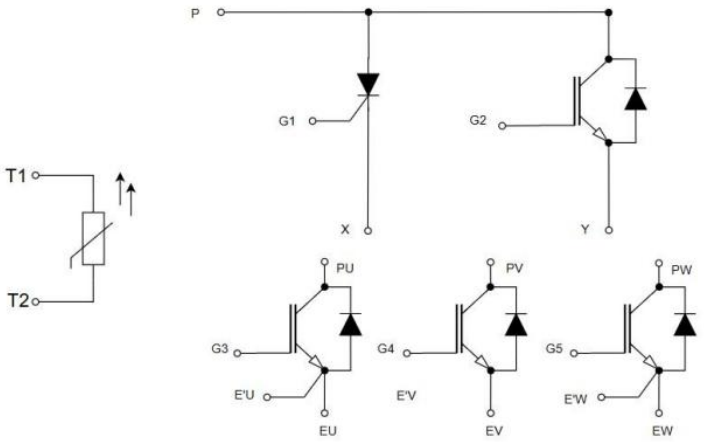
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F =35A, V_{GE}=0V， T_{vj} = 25°C	--	1.60	2.60	V
		I_F = 35A, V_{GE}=0V， T_{vj} = 125°C	--	1.55	--	
		I_F = 35A, V_{GE}=0V， T_{vj} = 150°C	--	1.50	--	
Qr	Recovered Charge	V_R=600V,I_F=35A, R_G = 10Ω,$V_{GE(on)}$ =15V,$V_{GE(off)}$ =－5V, T_{vj} =25℃	--	0.65	--	μC
I_{RM}	Peak Reverse Recovery Current		--	38	--	A
Trr	Reverse Recovery Time		--	25	--	ns
E_{rec}	Reverse Recovery Energy		--	0.7	--	mJ
Qr	Recovered Charge	V_R=600V,I_F=35A, R_G = 10Ω,$V_{GE(on)}$ =15V,$V_{GE(off)}$ =－5V, T_{vj} =150℃	--	1.14	--	μC
I_{RM}	Peak Reverse Recovery Current		--	39	--	A
Trr	Reverse Recovery Time		--	40	--	ns
E_{rec}	Reverse Recovery Energy		--	1.55	--	mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	0.81	--	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40	--	175[4)]	°C

[4)] $T_{vj\ op}$ > 150°C is only allowed for operation at overload conditions.

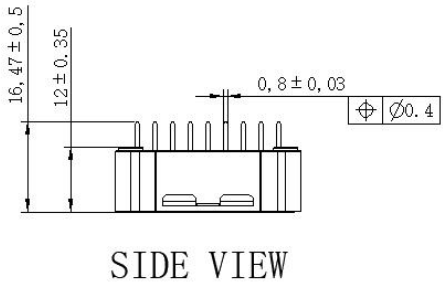
NTC Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R_{25}	Rated Resistance		--	5.0	--	kΩ
ΔR/R	Deviation of R100	Tc=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

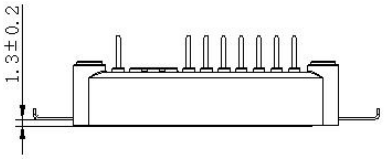
CIRCUIT DIAGRAM



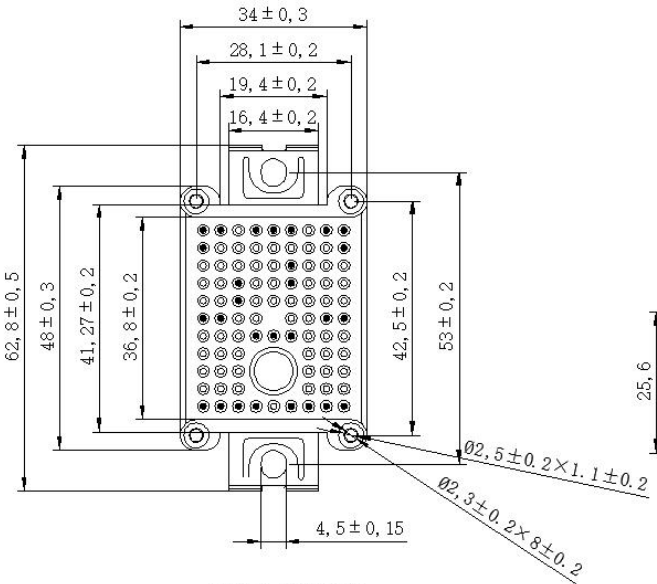
PACKAGE DIMENSION



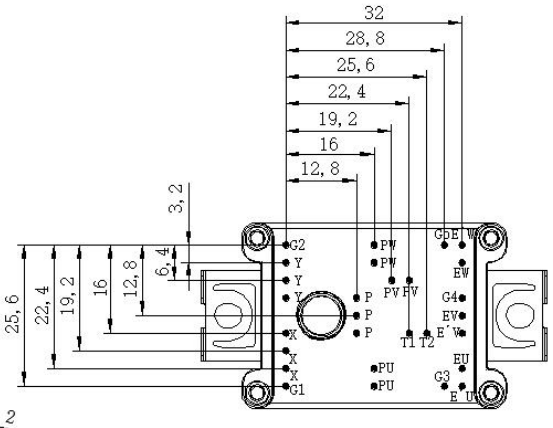
SIDE VIEW



SIDE VIEW



TOP VIEW



REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2025-03-10	Preview

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