

•General Description

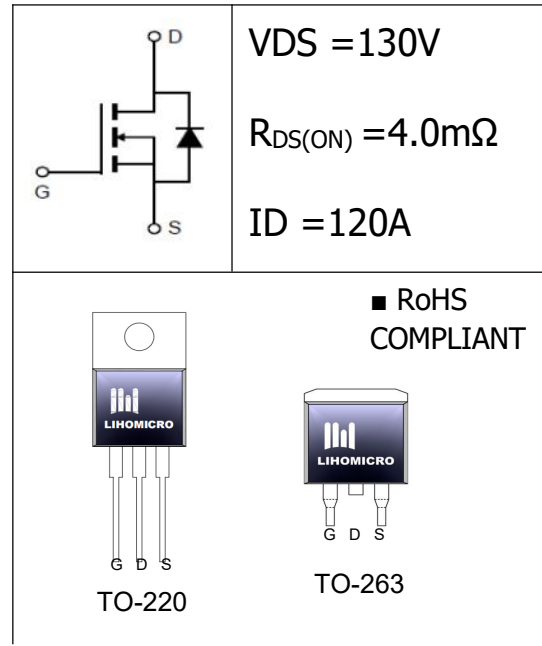
The N-Channel MOSFET LH045N130 has the low $R_{DS(on)}$, low gate charge, fast switching and excellent avalanche characteristics. This device is suitable for fast charge and lighting.

•Features

- Extremely low on-resistance $R_{DS(ON)}$
- Low Switching Charge
- Fully Characterized Capacitance and Avalanche

•Application

- BLDC Motor control and drive
- Power Supplies
- DC/DC Converters


•Ordering Information:

Part Number	LH045N130	LH045N130
Package	TO-220	TO-263
Basic Ordering Unit (pcs)	1000	800
Normal Package Material Ordering Code	LH045N130T-TO220-TU	LH045N130T63-TO263-TAP
Halogen Free Ordering Code	LH045N130T-TO220-TU-HF	LH045N130T63-TO263-TAP-HF

•Absolute Maximum Ratings (TC =25°C)

PARAMETER	SYMBOL	Value	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	130	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current, $T_C = 25^\circ\text{C}$	I_D	120	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax}) ¹	I_D pulse	480	A
Single Pulse Avalanche Energy ²	E_{AS}	915	mJ
Power Dissipation($T_C=25^\circ\text{C}$)	P_D	170	W
Operating Temperature	T_J	-55~+150	°C
Storage Temperature	T_{STG}	-55~+150	°C

●Electronic Characteristics

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	130	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	V
Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	--	3.8	4.5	mΩ
		$V_{GS}=6V, I_D=20A$	--	4.8	5.8	
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=130V, V_{GS}=0V, T_J=25^\circ C$	--	--	1	μA
		$V_{DS}=130V, V_{GS}=0V, T_J=125^\circ C$	--	--	10	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	±100	nA
Gate Resistance	R_g	$f=1MHz, \text{Open Drain}$	--	2.5	--	Ω
Forward Transconductance	G_{fs}	$V_{DS}=5V, I_{DS}=50A$	--	80	--	S
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=60V, f=1.0MHz$	--	6400	--	pF
Output Capacitance	C_{oss}		--	820	--	
Reverse transfer Capacitance	C_{rss}		--	30.2	--	
Turn-on delay time	$T_{d(on)}$	$V_{DS}=60V, V_{GS}=10V, I_D=20A$	--	25	--	nS
Rise time	T_r		--	16	--	
Turn -Off Delay Time	$T_{d(off)}$		--	90	--	
Fall time	T_f		--	78	--	
Total Gate Charge	Q_g	$I_D=20A, V_{DS}=60V, V_{GS}=10V$	--	108	---	nC
Gate-to-Source Charge	Q_{gs}		--	24	--	
Gate-to-Drain Charge	Q_{gd}		--	36	---	
Continuous Diode Forward Current	I_S	--	--	--	120	A
Diode Forward Voltage	V_{SD}	$T_J=25^\circ C, I_S=50A, V_{GS}=0V$	--	--	1.2	V

●Thermal Characteristics

PARAMETER	SYMBOL	MAX	UNIT
Thermal Resistance Junction-case	R_{thJC}	1.0	°C/W
Thermal Resistance Junction-ambient	R_{thJA}	62.5	°C/W

Notes:

1.Repetitive Rating: Pulse width limited by maximum junction temperature.

2. $I_{AS}=60A, V_{DD}=60V, L=0.5mH, R_G=50\Omega, \text{Starting } T_J=25^\circ C$

● **Typical Characteristics**

Fig.1 Output Characteristics

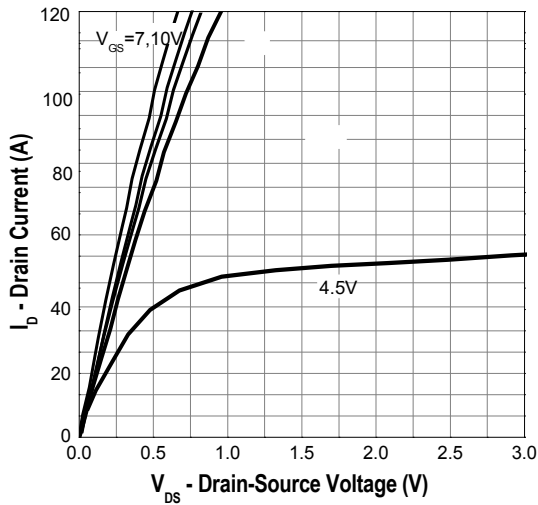


Fig.2 Gate Threshold Voltage

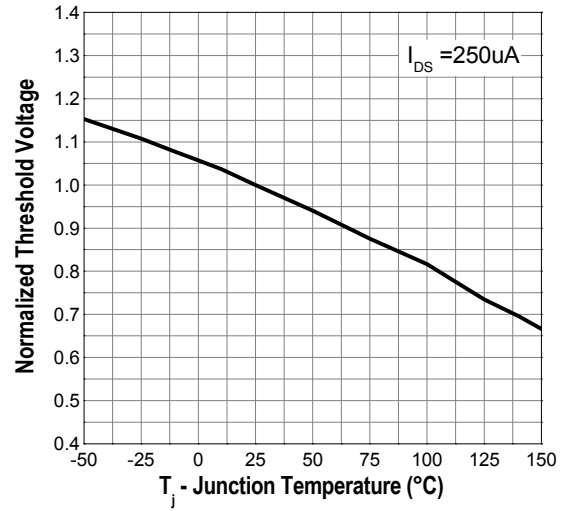


Fig.3 Gate-Source On Resistance

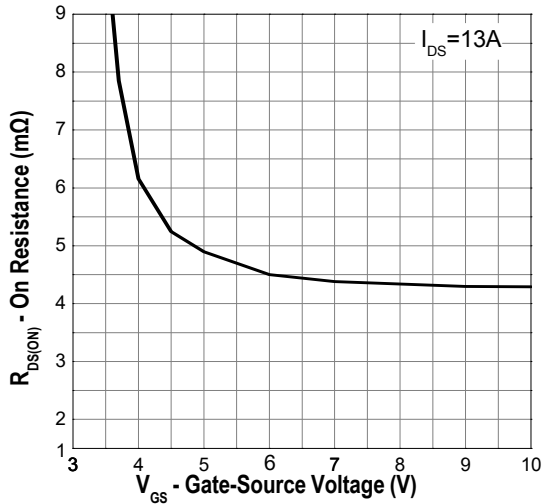


Fig.4 Drain-Source On Resistance

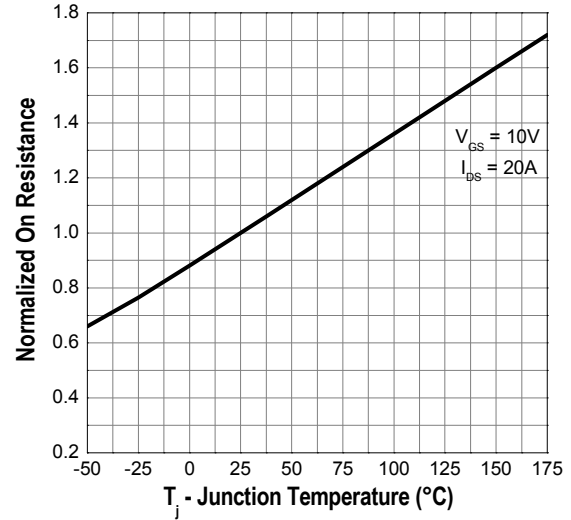


Fig.5 Dource-Drain Forward Characteristics

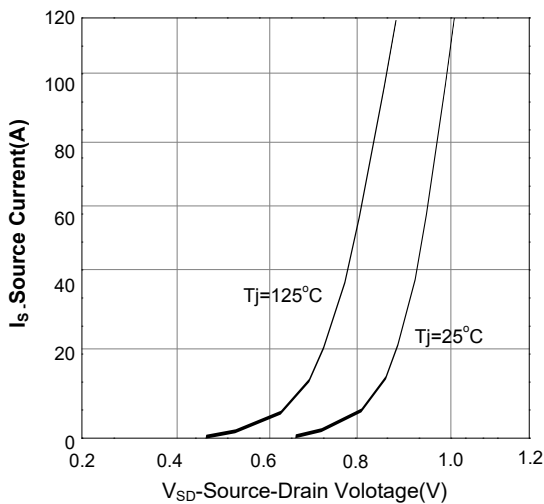
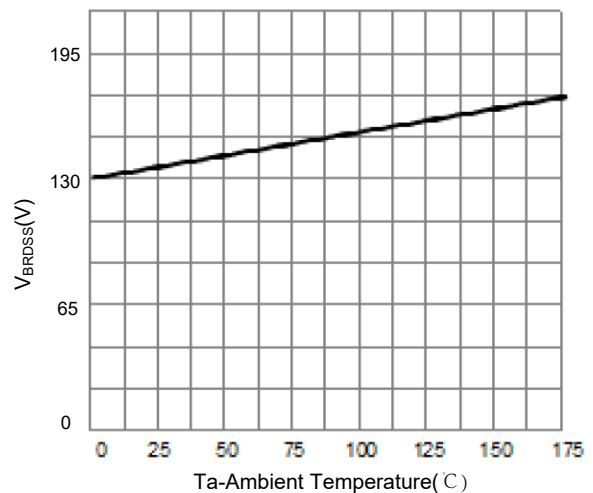


Fig.6 Drain-Source Breakdown Voltage



● **Typical Characteristics**(cont.)

Fig.7 Power Dissipation

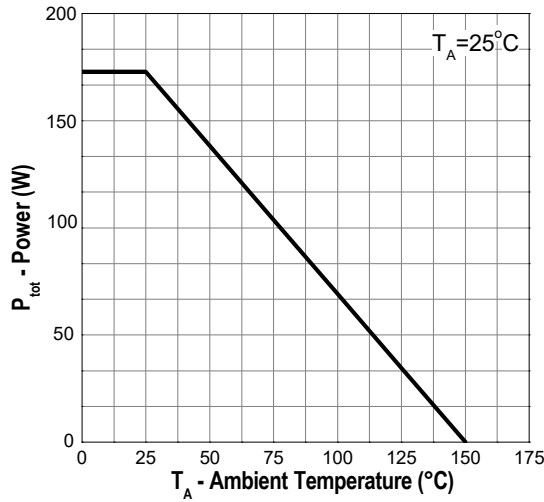


Fig.8 Drain Current

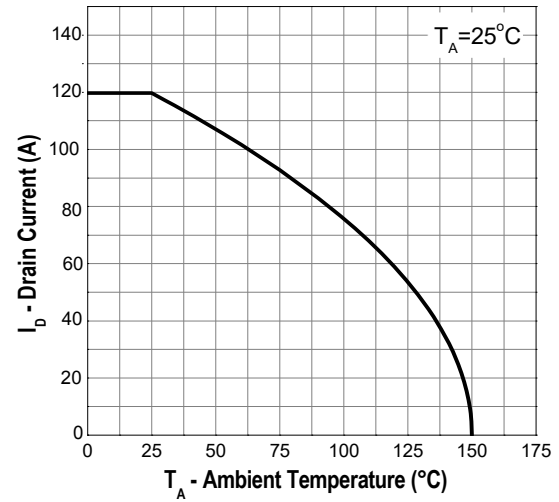


Fig.11 Capacitance

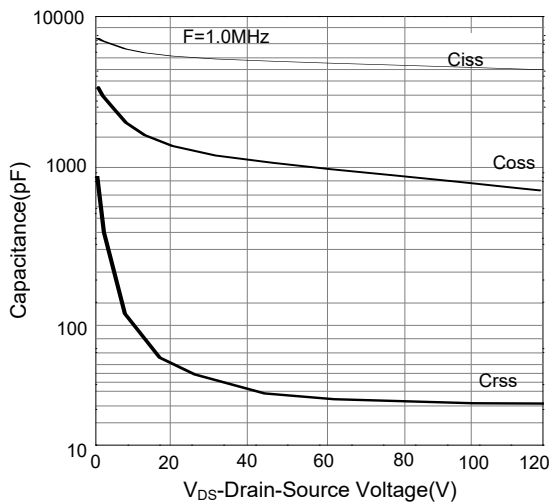


Fig.12 Gate Charge

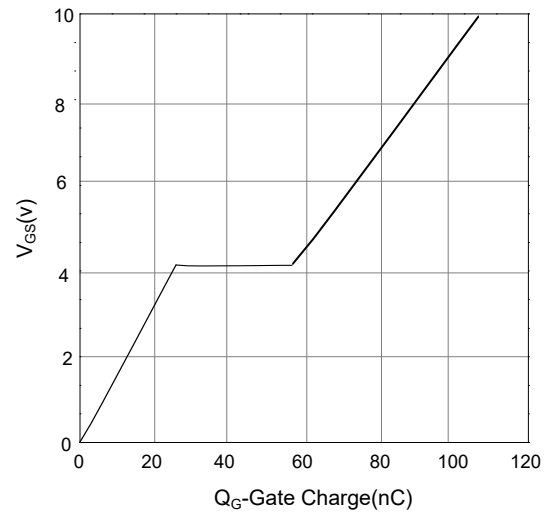


Fig.11 Safe Operation Area

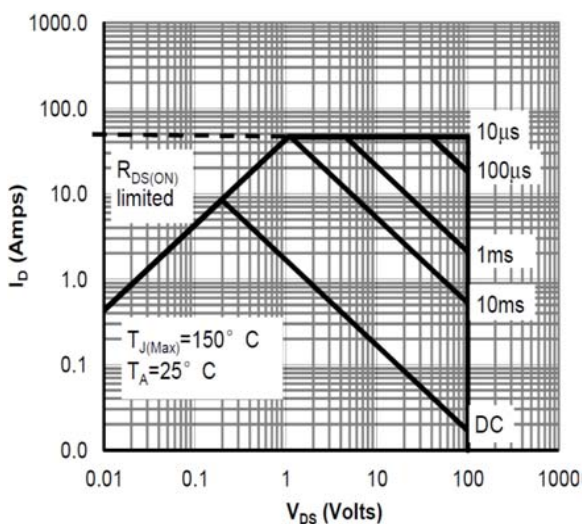
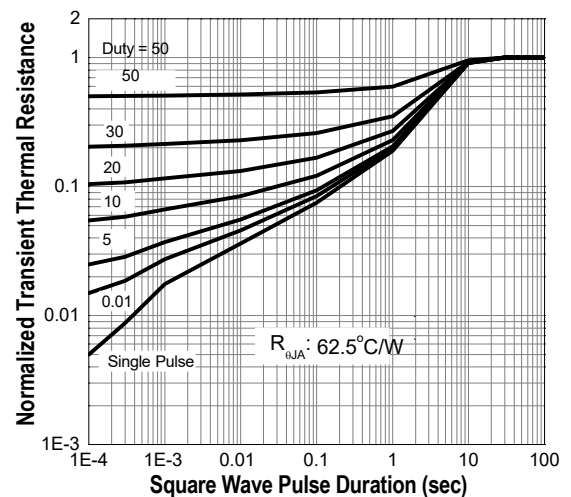
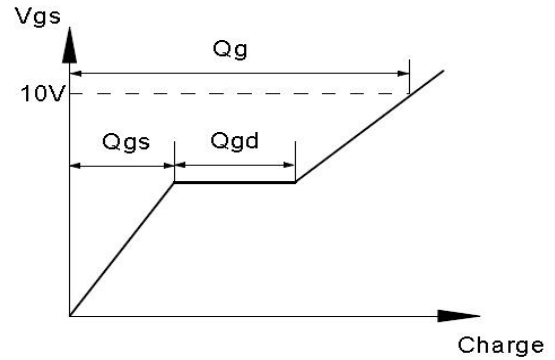
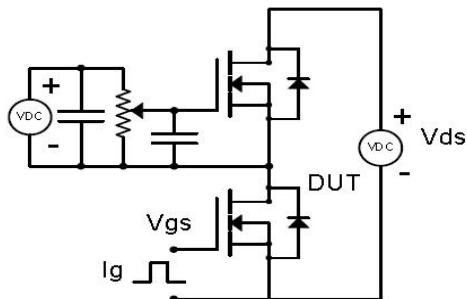


Fig.12 Transient Thermal Impedance

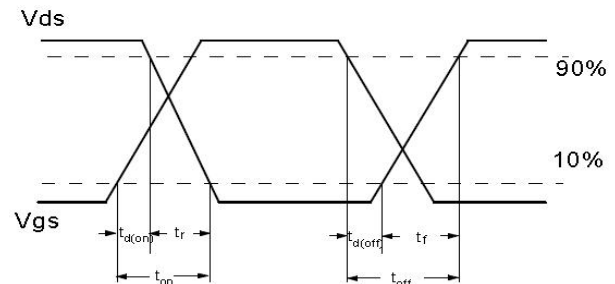
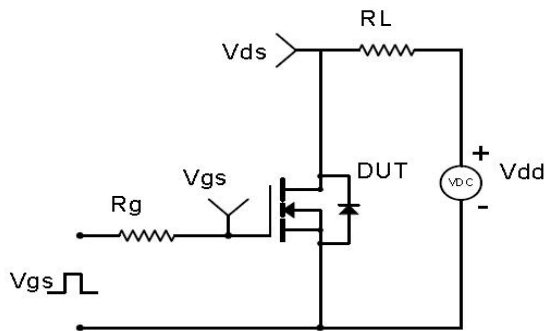


• Test Circuits & Waveforms

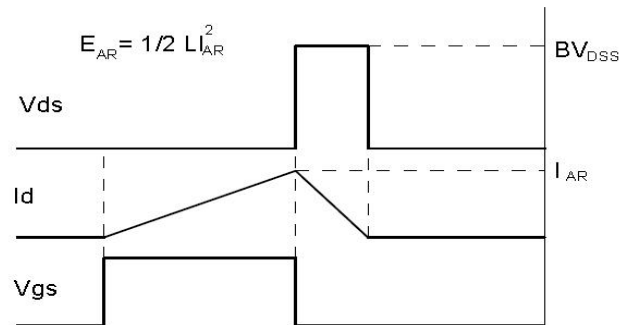
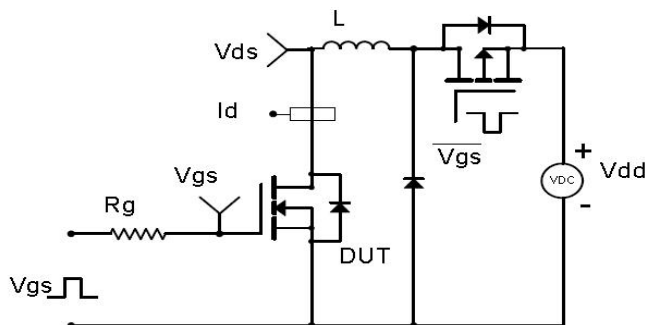
Gate Charge Test Circuit & Waveform



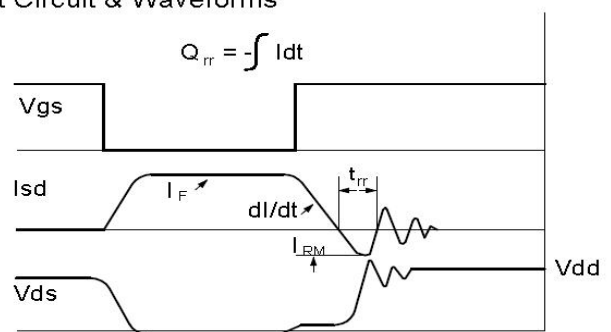
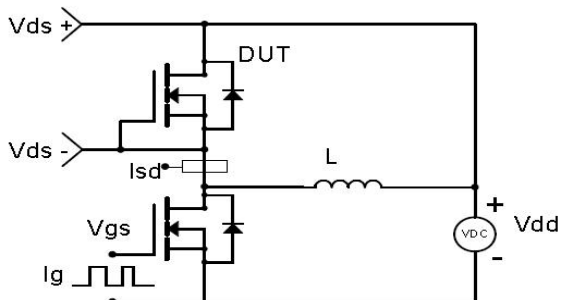
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



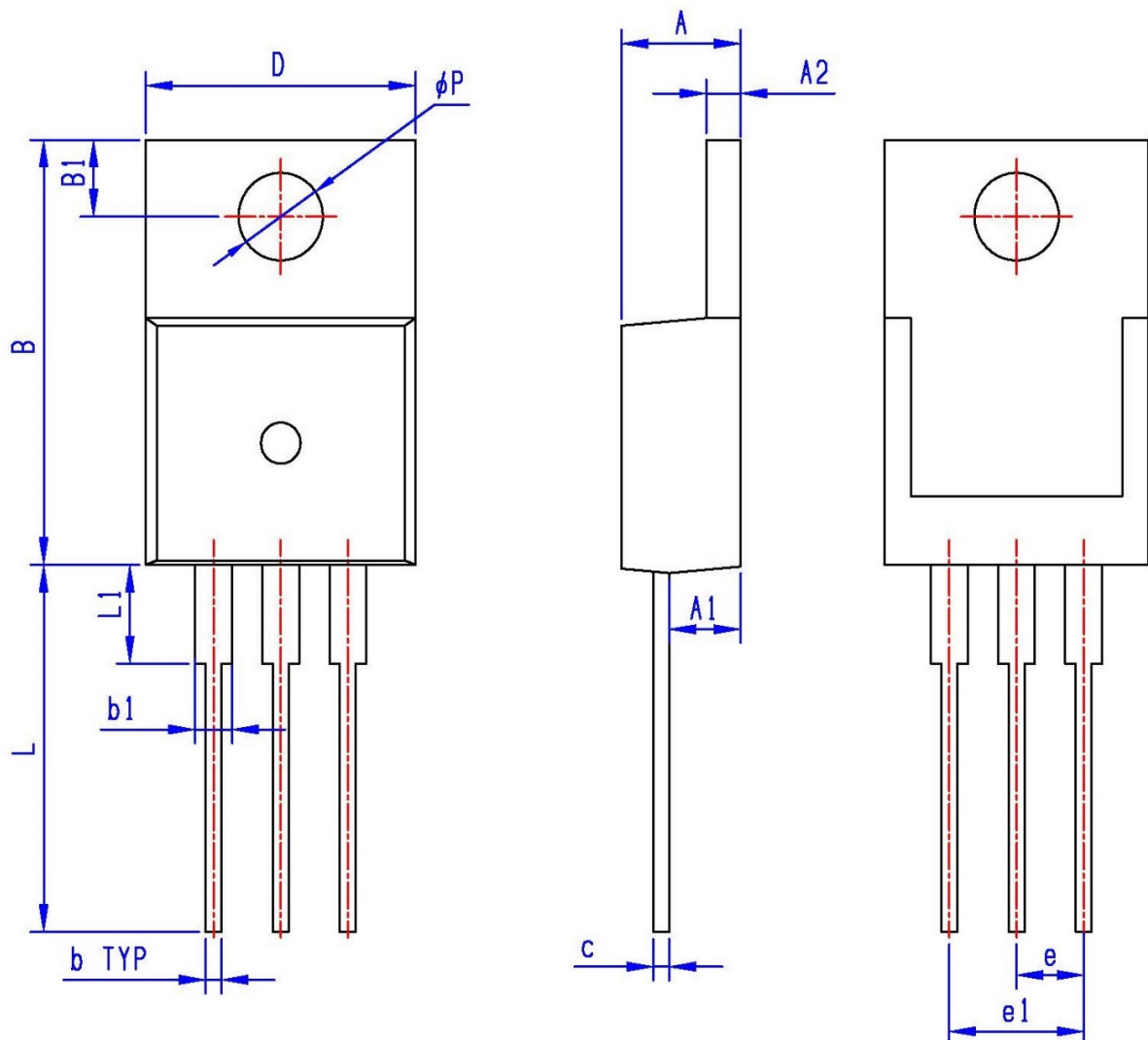
Diode Recovery Test Circuit & Waveforms



• **Dimensions (TO-220)**

Unit:mm

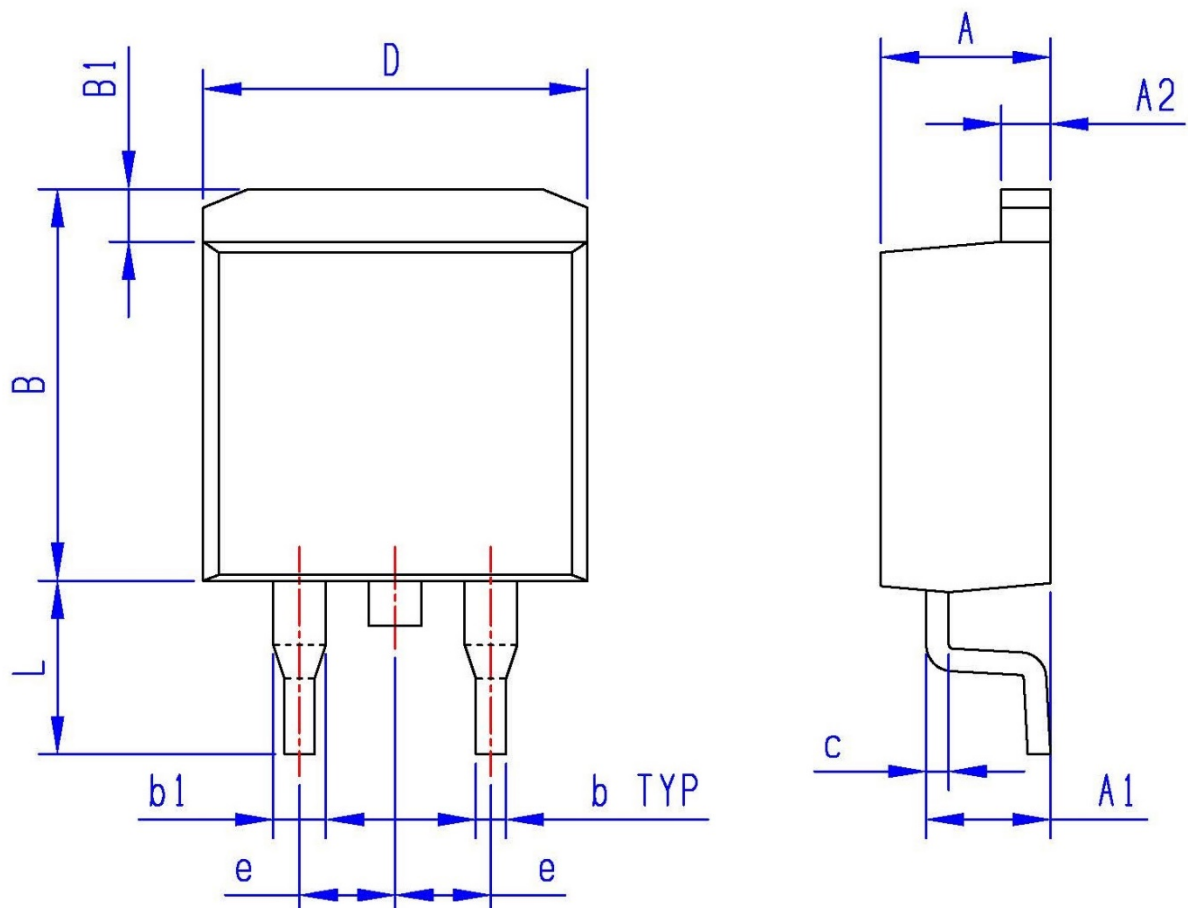
SYMBOL	min	max	SYMBOL	min	max
A	4.25	4.85	B1	2.60	3.00
A1	2.30	3.00	e	2.40	2.70
A2	1.20	1.40	e1	4.95	5.25
b	0.60	0.90	L	12.40	14.20
b1	1.10	1.70	L1	2.40	3.40
c	0.40	0.70	∅P	3.50	3.90
D	9.80	10.60			
B	15.20	16.20			



• Dimensions (TO-263)

Unit: mm

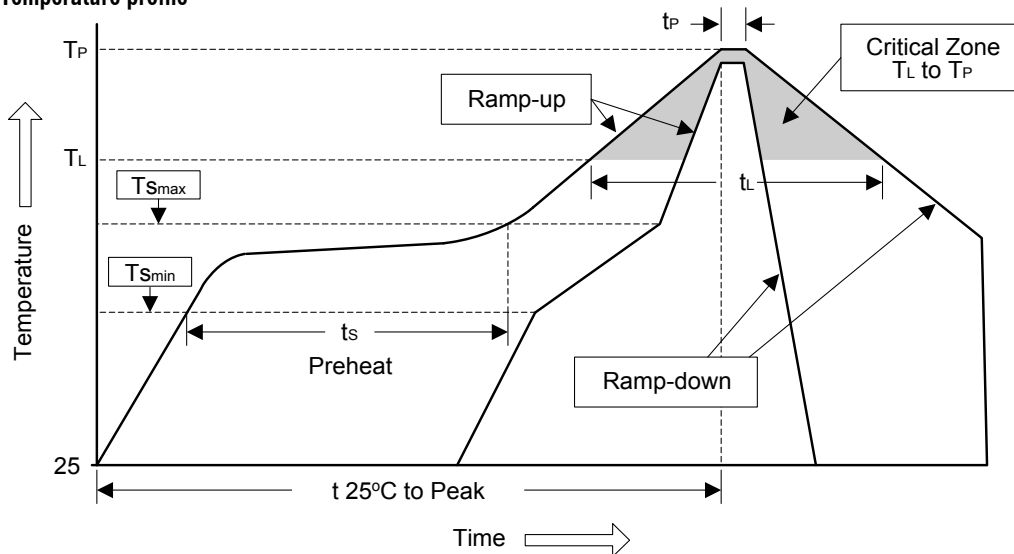
SYMBOL	min	max	SYMBOL	min	max
A	4.25	4.85	B1	1.20	1.80
A1	2.30	3.00	e	2.40	2.70
A2	1.20	1.40	L	4.80	5.60
b	0.60	0.90			
b1	1.10	1.70			
c	0.40	0.70			
D	9.80	10.60			
B	10.40	11.40			



• Soldering Methods for Lihomicro's Products

- 1.Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
- 2.Molder Plastic: UL Flammability Classification Rating 94V-0
- 3.Reflow soldering of surface-mount devices

Figure 1: Temperature profile



● Classification Reflow Profiles

Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T_{Smin})	100°C	150°C
- Temperature Max (T_{Smax})	150°C	200°C
- Time (min to max) (ts)	60 to 120 sec	60 to 180 sec
T_{Smax} to T_L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T_L)	183°C	217°C
- Time (t_L)	60 to 150 sec	60 to 150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

● Reliability Test Program

Testitem	Method	Description
Solderability	JESD-22,B102	5sec , 245°C
Holt	JESD-22,A108	1000Hrs,Bias@125°C
PCT	JESD-22,A102	168Hrs,100%RH,2atm,121°C
TCT	JESD-22,A104	500Cycles, -65°C ~150°C