LS Industrial Systems

LWH150G1201

SUSPM™
1200V 150A 2-Pack IGBT Module

Preliminary data

Features

- Soft Punch Through (SPT$^+$) Technology
  - Low Loss
  - Highly rugged SPT$^+$ desgin
- Free Wheeling Diodes with soft reverse recovery
- Industrial standard package with copper base plate

Applications

- Welder / Power Supply
- UPS / Inverter
- Industrial Motor Drive
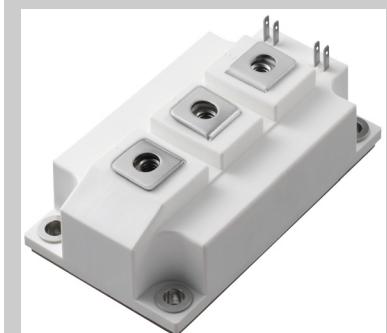
SUSPM3
108 x 62 x 29.87 mm

Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Item	Symbol	Conditions	Value	Units
IGBT	V_{CES}		1200	V
	V_{GES}		± 20	V
	I_C	@T_j= 150 °C, T_C = 25 °C, Continuous	300	A
		@T_j= 150 °C, T_C = 80°C, Continuous	150	A
	I_{CM}	@T_C = 80 °C, tp=1ms	300	A
	T_{SC}	Chip Level, @T_j =125°C, V_{GE}= 15V, V_{CES} < 1200V	10	µs
	T_j	Operating Junction Temperature $^{*(1)}$	-40~125	°C
	P_D	@T_j= 150 °C, T_C = 25 °C	900	W
		@T_j= 150 °C, T_C = 80 °C	500	W
Diode	V_{RRM}		1200	V
	I_F		150	A
	I_{FRM}	tp=1ms	300	A
	T_j	Operating Junction Temperature $^{*(1)}$	-40~125	°C
Module	T_{stg}	Storage Junction Temperature	-40~125	°C
	V_{iso}	@AC 1minute	2500	V
	M_t	Main Terminal Mounting torque(M6)	2.5~6.0	Nm
	M_S	Heat sink Mounting torque(M6)	3.0~6.0	Nm
	W	Weight	350	g

Internal Circuit & Pin Description

Pin Number	Pin Name	Pin Description
1	C2E1	Output
2	E2	Negative DC Link Ouput
3	C1	Positive DC Link Ouput
4	G1	Gate Input for High-side
5	E1	Emitter Input for High-side
6	G2	Gate Input for Low-side
7	E2	Emitter Input for Low-side
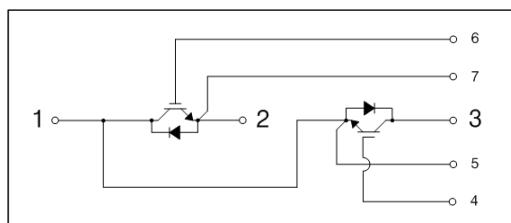
(Note *1) The Maximum junction temperature of chip is 150°C

Electrical Characteristics of IGBT T_C = 25°C unless otherwise noted

Static Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{CES}	C-E Breakdown Voltage	V_{GE} = 0V, I_C = 1mA	1200	-	-	V
I_{CES}	C-E Cut-Off Current	V_{CE} = V_{CES}, V_{GE} = 0V	-	-	1	mA
I_{GES}	G-E Leakage Current	V_{GE} = V_{GES}, V_{CE} = 0V	-	-	-	nA
$V_{GE(th)}$	G-E Threshold Voltage	V_{GE} = V_{CE}, I_C=150mA	-	6.7	-	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C =150A, V_{GE} = 15V, T_C=25°C	-	2.00	-	V
		I_C =150A, V_{GE} = 15V, T_C=125°C	-	2.30	-	V

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V f = 1MHz, T_C=25°C	-	10.6	-	nF
C_{oes}	Output Capacitance		-	0.71	-	nF
C_{res}	Reverse Transfer Capacitance		-	0.47	-	nF
t_d(on)	Turn-On Delay Time	T_C=125°C,R_G=8.2Ω L=100 µH, V_{DC}=600V V_{GE}=15V ~ -15V I_C=150A	-	104	-	ns
t_r	Rise Time		-	55	-	ns
t_d(off)	Turn-Off Delay Time		-	937	-	ns
t_f	Fall Time		-	297	-	ns
E_{on}	Turn-On Switching Loss		-	22.3	-	mJ
E_{off}	Turn-Off Switching Loss		-	16.9	-	mJ
E_{ts}	Total Switching Loss		-	39.2	-	mJ
Q_g	Total Gate Charge	V_{GE}=0V ~ +15V	-	0.99	-	µC
Q_{ge}	Gate-Emitter Charge		-	0.13	-	µC
Q_{gc}	Gate-Collector Charge		-	0.62	-	µC

Electrical Characteristics of Diode T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
V_F	Diode Forward Voltage	I_F=150A, V_{GE}=0V	T_C = 25°C	-	1.70	-	V
			T_C = 125°C	-	1.70	-	
t_{rr}	Diode Reverse Recovery Time	R_G=8.2 Ω L=100 µH V_{DC}=600V V_{GE}=15V ~ -15V I_C=150A	T_C = 25°C	-	447	-	ns
			T_C = 125°C	-	685	-	
I_{RRM}	Diode Peak Reverse Recovery Current		T_C = 25°C	-	177	-	A
			T_C = 125°C	-	239	-	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25°C	-	20.7	-	µC
			T_C = 125°C	-	44.1	-	
E_{rr}	Diode Reverse Recovery Energy		T_C = 25°C	-	6.9	-	mJ
			T_C = 125°C	-	16.2	-	

Thermal Characteristics

| Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$R_{th(J-C)}$	Thermal Resistance (IGBT Part)	Junction-to-Case	-	0.13	-	°C/W
$R_{th(J-C)D}$	Thermal Resistance (Diode Part)	Junction-to-Case	-	-	-	°C/W

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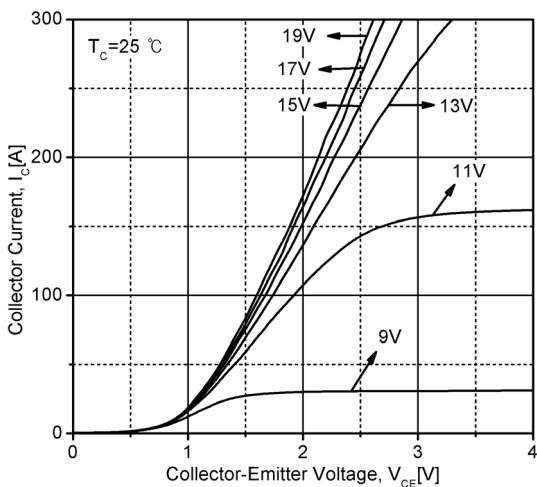
**Fig 1. Typical IGBT Output Characteristics**
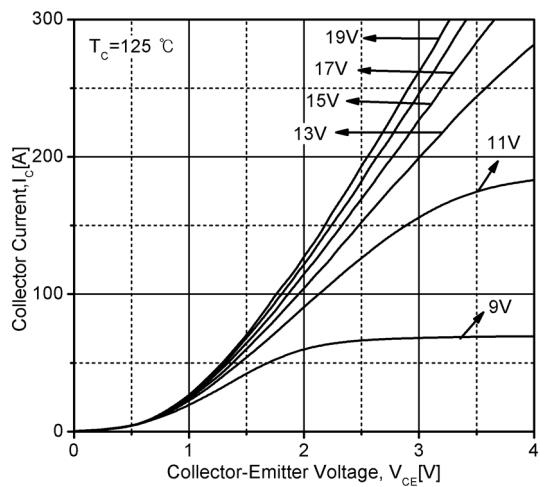
**Fig 2. Typical IGBT Output Characteristics**
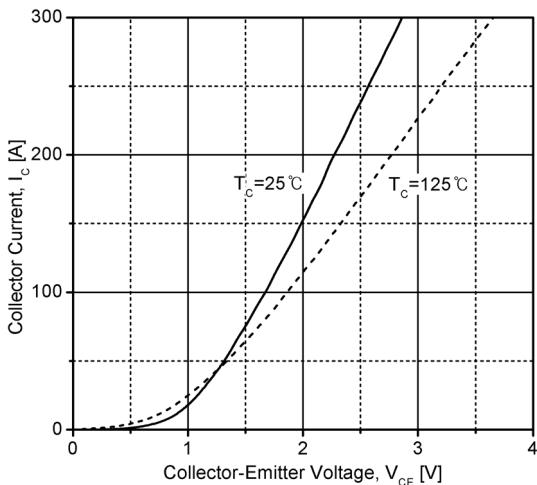
Fig 3. Typical IGBT Output Characteristics
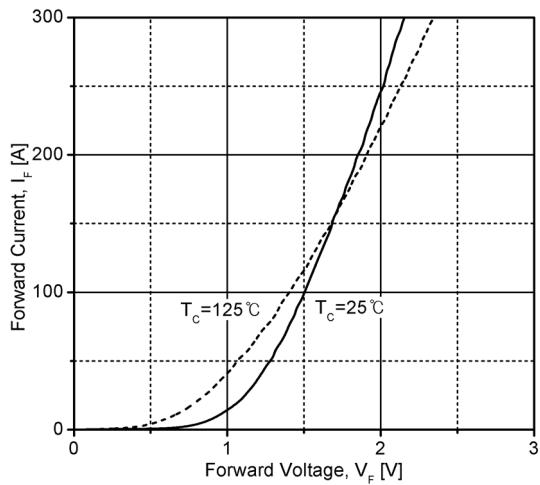
Fig 4. Typical Diode Forward Characteristics
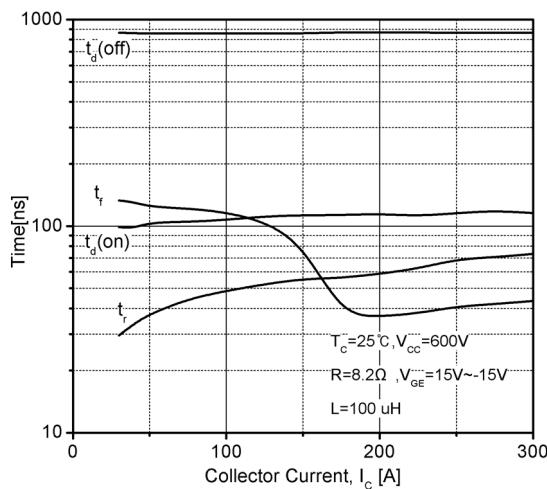
Fig 5. Typical Switching Time vs. Collector Current
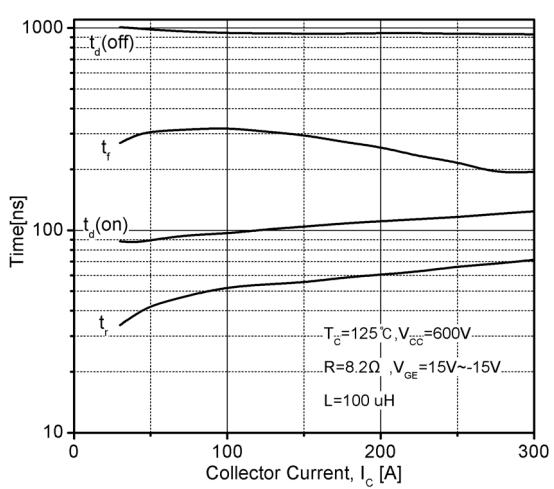
**Fig 6. Typical Switching Time vs. Collector Current**
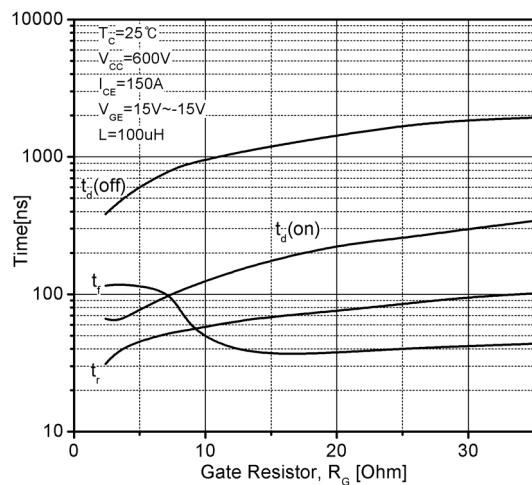
Fig 7. Typical Switching Time vs. Gate Resistor
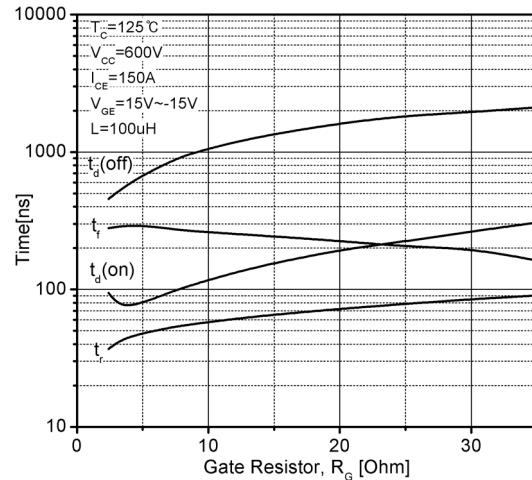

Fig 8. Typical Switching Time vs. Gate Resistor
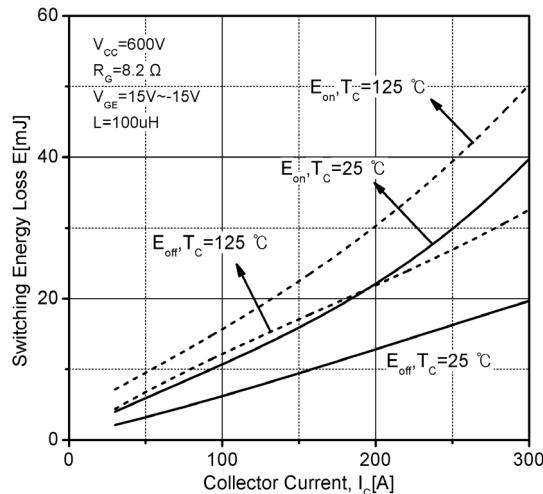
Fig 9. Typical IGBT Switching Loss
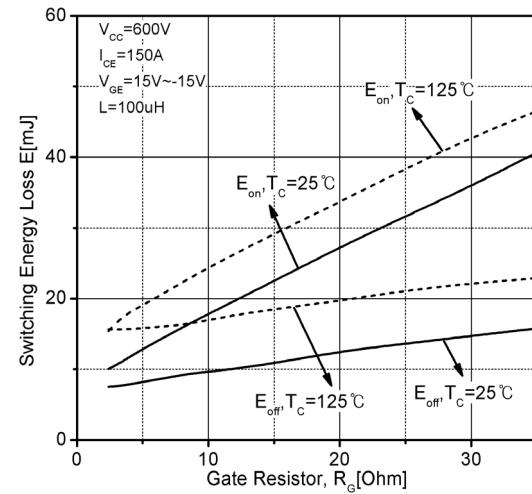
**Fig 10. Typical IGBT Switching Loss**
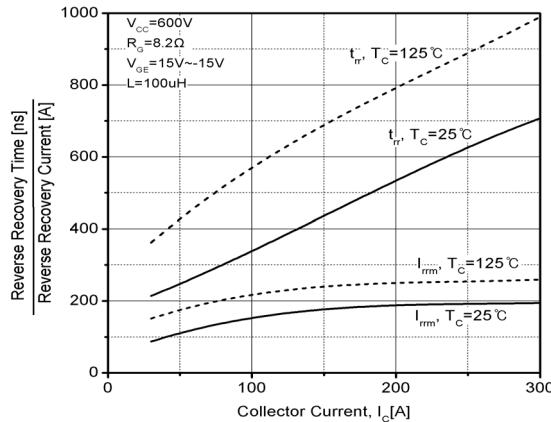

Fig 11. Typical Recovery Characteristics of Diode
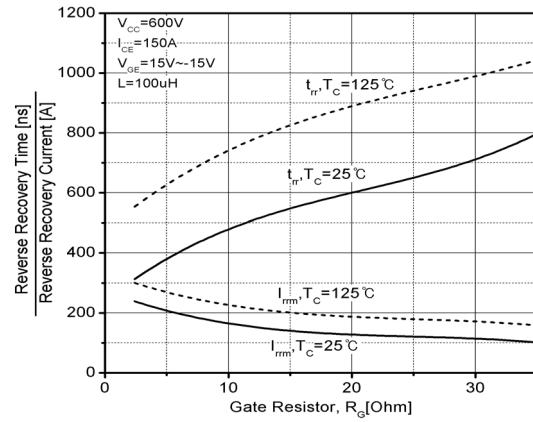
Fig 12. Typical Recovery Characteristics of Diode

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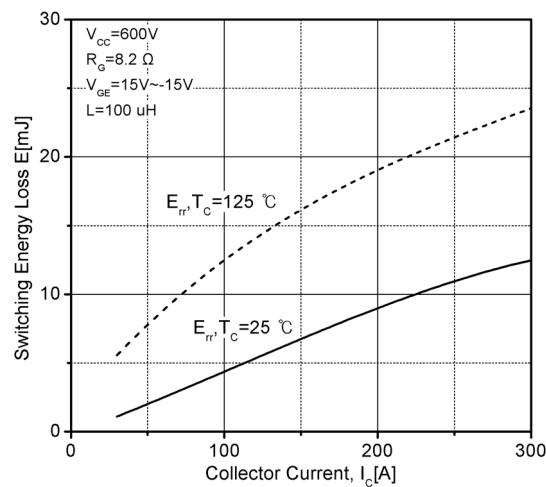
**Fig 13. Typical Diode Switching Loss**
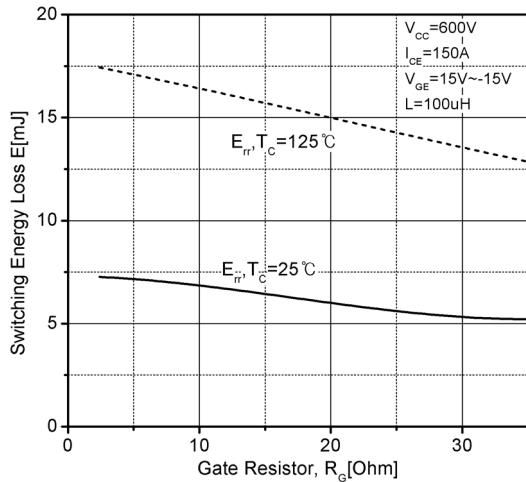
Fig 14. Typical Diode Switching Loss
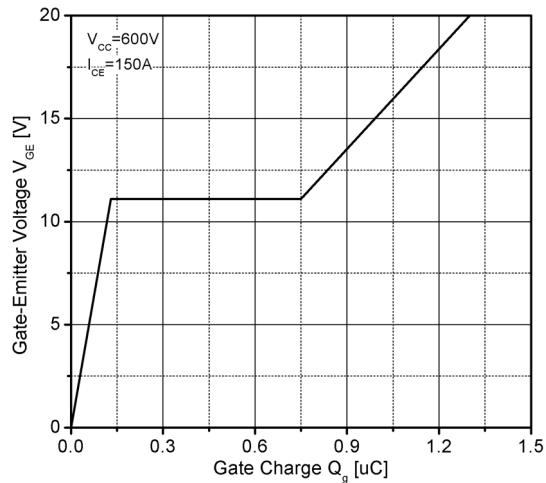
Fig 15. Typical Gate Charge Characteristics
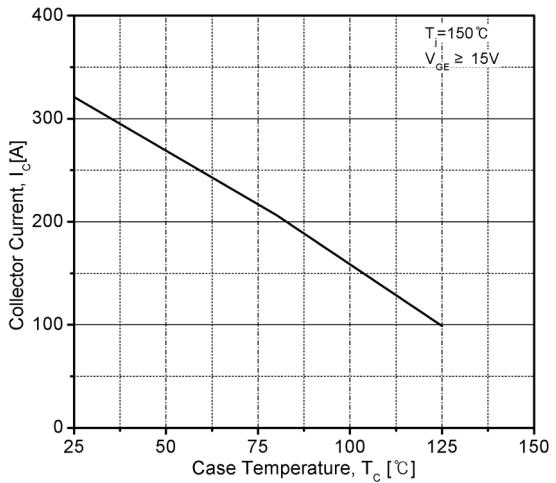
Fig 16. Case Temperature vs. Collector Current
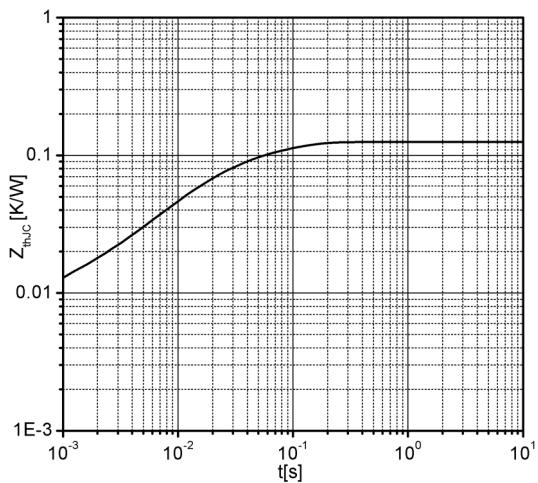
Fig 17. Typical Transient Thermal Impedance

Package Dimension(Dimension in mm)