

LUH75G1201_Preliminary
LUH75G1201Z*_Preliminary

SUSPM™

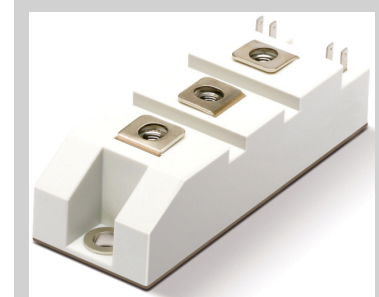
1200V 75A 2-Pack IGBT Module

Features

- Soft punch through IGBT(SPT⁺ IGBT)
 - Low saturation voltage
 - Positive temperature coefficient
 - Fast switching
 - High ruggedness
- Free wheeling diodes with fast and soft reverse recovery
- Industrial standard package with copper base plate
- 10us short circuit rated
- Included gate surge protection function

Application

- Welder
- Power supply
- Industrial motor drive
- Induction heating



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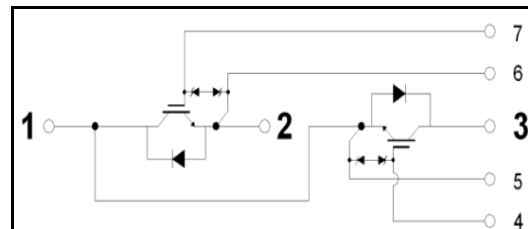
94 X 34 X 30mm

Absolute Maximum Ratings $T_C = 25^{\circ}\text{C}$ unless otherwise noted

Item	Symbol	Condition	Value	Units
IGBT	V_{CES}	@ $T_C = 25^{\circ}\text{C}$	1200	V
	V_{GES}	@ $T_C = 25^{\circ}\text{C}$	± 20	V
	I_C	@ $T_C = 25^{\circ}\text{C}$	140	A
		@ $T_C = 80^{\circ}\text{C}$	75	A
	I_{CM}	$t_p = 1\text{ms}$	150	A
	T_{sc}	@ $T_j = 125^{\circ}\text{C}$, $V_{CC} = 600\text{V}$, $V_{GE} = 15\text{V}$	10	μs
	$T_{j(max)}$	Maximum chip junction temperature	-40 to +150	$^{\circ}\text{C}$
Inverse diode	V_{RRM}	@ $T_C = 25^{\circ}\text{C}$	1200	V
		@ $T_C = 80^{\circ}\text{C}$	-	A
	I_F	@ $T_C = 25^{\circ}\text{C}$	-	A
		@ $T_C = 80^{\circ}\text{C}$	-	A
	I_{FRM}	@ $T_C = 25^{\circ}\text{C}$, $t_p = 1\text{ms}$	-	A
$T_{j(max)}$	Maximum chip junction temperature	-40 to +150	$^{\circ}\text{C}$	
Module	P_D	@ $T_C = 25^{\circ}\text{C}$	390	W
		@ $T_C = 80^{\circ}\text{C}$	220	W
	T_{stg}	Storage junction temperature	-40 to +125	$^{\circ}\text{C}$
	$T_{j(op)}$	Operating junction temperature	-40 to +125	$^{\circ}\text{C}$
	V_{iso}	@AC 1minute	2500	V
	Bolt length	Recommended Main Terminal bolt length(M5)	8 ~ 12	mm
	M_t	Main terminal mounting torque(M5)	2.5 ~ 5.0	Nm
M_s	Heat sink mounting torque(M6)	3.0 ~ 5.0	Nm	
W	Weight	170	g	

Internal Circuit & Pin Description

Pin Number	Pin Name	Pin Description
1	C2E1	Output
2	E2	Negative dc link output
3	C1	Positive dc link output
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



Electrical Characteristics of IGBT $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	C-E breakdown voltage	$V_{GE} = 0V, I_C = 250\mu A$	1200	-	-	V
I_{CES}	Collector cut-off current	$V_{CE} = V_{CES}, V_{GE} = 0V$	-	-	1.0	mA
I_{GES}	G-E leakage current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	200	nA

Off Characteristics

BV_{CES}	C-E breakdown voltage	$V_{GE} = 0V, I_C = 250\mu A$	1200	-	-	V
I_{CES}	Collector cut-off current	$V_{CE} = V_{CES}, V_{GE} = 0V$	-	-	1.0	mA
I_{GES}	G-E leakage current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	200	nA

On Characteristics

$V_{GE(th)}$	G-E threshold voltage	$V_{GE} = V_{CE}, I_C = 75mA$	6.4	6.9	7.4	V
$V_{CE(sat)}$	Collector to emitter	$I_C = 75A, V_{GE} = 15V, T_C = 25^\circ\text{C}$	-	1.92	2.42	V
	Saturation voltage	$I_C = 75A, V_{GE} = 15V, T_C = 125^\circ\text{C}$	-	2.14	-	V

Dynamic Characteristics

C_{ies}	Input capacitance	$V_{CE} = 25V, V_{GE} = 0V,$ $f = 1MHz, T_C = 25^\circ\text{C}$	-	5.52	-	nF
C_{oes}	Output capacitance		-	0.40	-	nF
C_{res}	Reverse transfer capacitance		-	0.26	-	nF

Switching Characteristics

$t_{d(on)}$	Turn-on delay time	$T_C = 25^\circ\text{C}, R_G = 15\text{ ohm}$ $L = 100\text{ uH}, V_{CC} = 600V$ $V_{GE} = \pm 15$ $I_C = 75A$	-	110	-	ns
t_r	Rise time		-	50	-	ns
$t_{d(off)}$	Turn-off delay time		-	480	-	ns
t_f	Fall time		-	120	-	ns
E_{on}	Turn-on switching loss		-	6.75	-	mJ
E_{off}	Turn-off switching loss		-	3.90	-	mJ
E_{ts}	Total switching loss	-	10.65	-	mJ	
$t_{d(on)}$	Turn-on delay time	$T_C = 125^\circ\text{C}, R_G = 15\text{ ohm}$ $L = 100\text{ uH}, V_{CC} = 600V$ $V_{GE} = \pm 15$ $I_C = 75A$	-	110	-	ns
t_r	Rise time		-	50	-	ns
$t_{d(off)}$	Turn-off delay time		-	545	-	ns
t_f	Fall time		-	235	-	ns
E_{on}	Turn-on switching loss		-	8.0	-	mJ
E_{off}	Turn-off switching loss		-	6.5	-	mJ
E_{ts}	Total switching loss	-	14.5	-	mJ	
Q_g	Total gate charge	$V_{GE} = 0V \sim +15V$	-	-	-	nC
Q_{ge}	Gate-emitter charge		-	-	-	nC
Q_{gc}	Gate-collector charge		-	-	-	nC

Electrical Characteristics of Inverse Diode $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
V_F	Diode forward voltage	$I_F = 75A, V_{GE} = 0V$	$T_C = 25^\circ\text{C}$	-	1.58	2.08	V
			$T_C = 125^\circ\text{C}$	-	1.62	-	
t_{rr}	Diode reverse recovery time	-	$T_C = 25^\circ\text{C}$	-	547	-	ns
			$T_C = 125^\circ\text{C}$	-	394	-	
I_{RRM}	Diode peak reverse recovery current	$R_G = 15\text{ Ohm}$ $L = 100\text{ uH}, V_{CC} = 600V$ $V_{GE} = \pm 15V, I_F = 75A$	$T_C = 25^\circ\text{C}$	-	130	-	A
			$T_C = 125^\circ\text{C}$	-	100	-	
Q_{rr}	Diode reverse recovery charge	-	$T_C = 25^\circ\text{C}$	-	20.35	-	uC
			$T_C = 125^\circ\text{C}$	-	11.13	-	
E_{rr}	Diode reverse recovery energy	-	$T_C = 25^\circ\text{C}$	-	-	-	mJ
			$T_C = 125^\circ\text{C}$	-	-	-	

Thermal Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Min	Typ.	Max.	Units
$R_{th(J-C)}$	Junction-to-case (IGBT part)	-	-	0.32	$^\circ\text{C}/\text{W}$
$R_{th(J-C)D}$	Junction-to-case (Diode part)	-	-	-	$^\circ\text{C}/\text{W}$

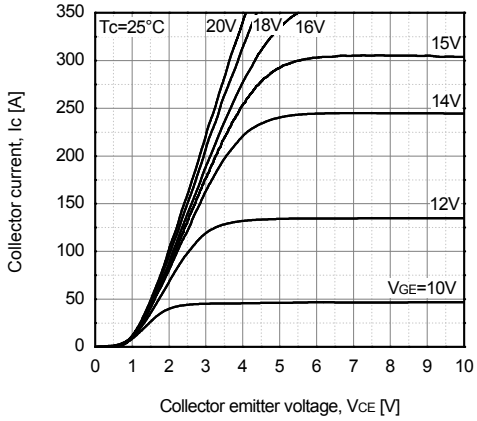


Fig 1. Typical output characteristics

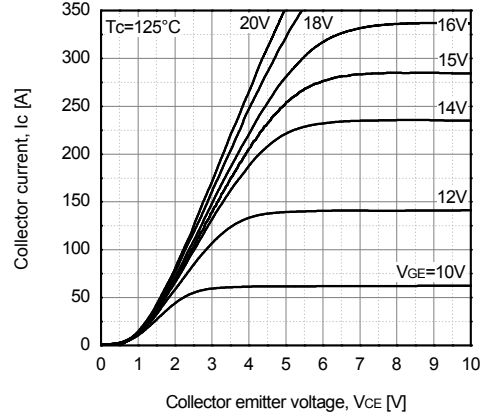


Fig 2. Typical output characteristics

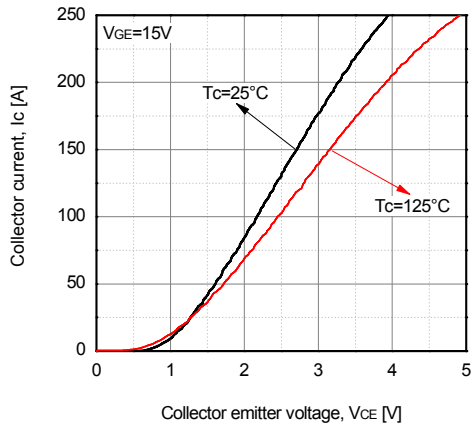


Fig 3. Typical transfer characteristics

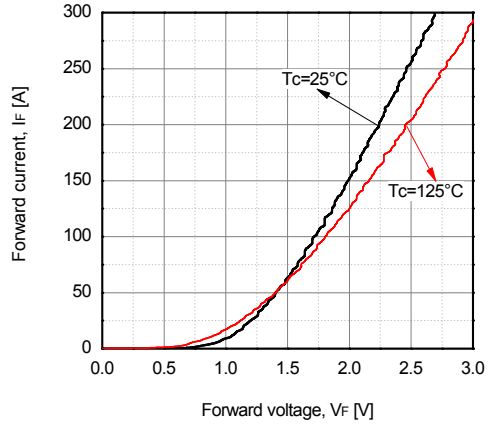


Fig 4. Typical diode forward characteristics

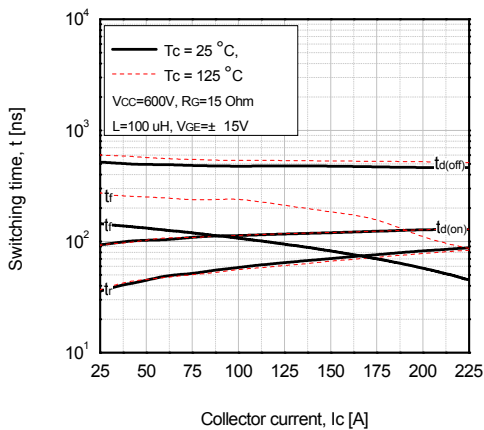


Fig 5. Typical switching time vs collector current

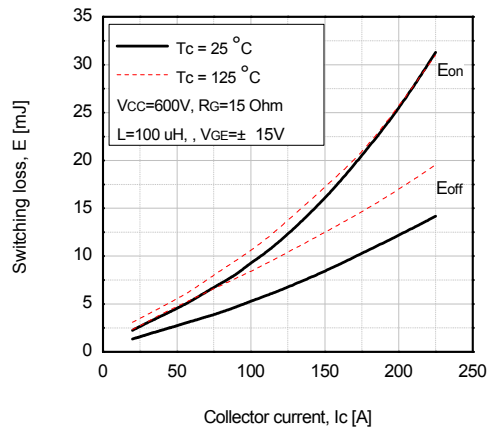


Fig 6. Typical switching loss vs collector current

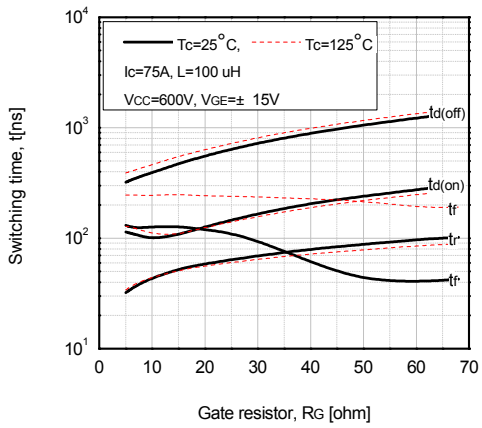


Fig 7. Typical switching time vs gate resistor

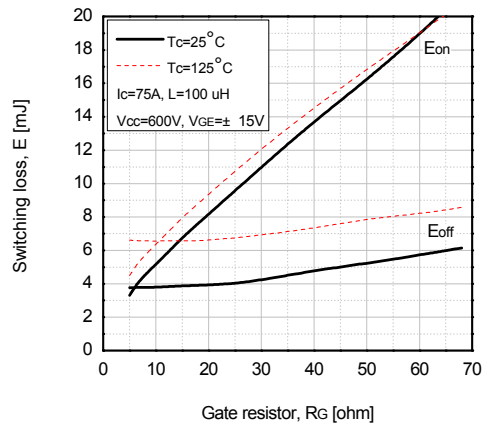


Fig 8. Typical switching loss vs gate resistor

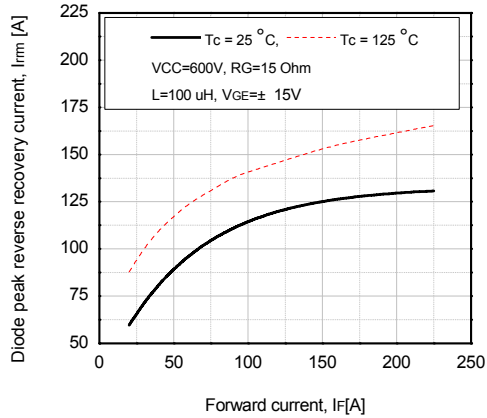


Fig 9. Diode peak reverse recovery current vs forward current

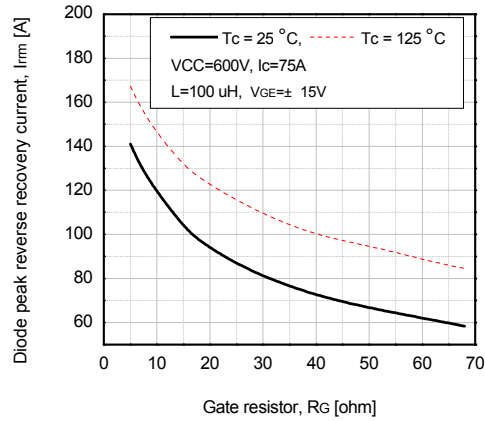


Fig 10. Diode peak reverse recovery current vs gate resistor

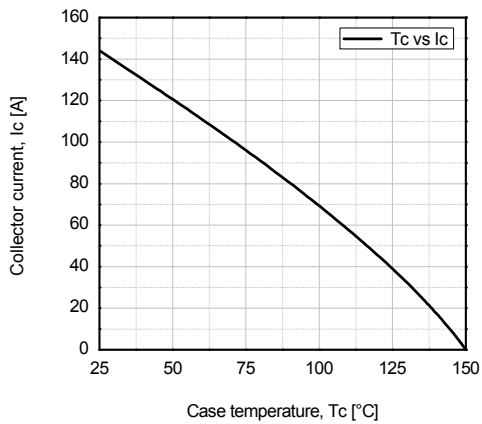


Fig 11. Case temperature vs collector current

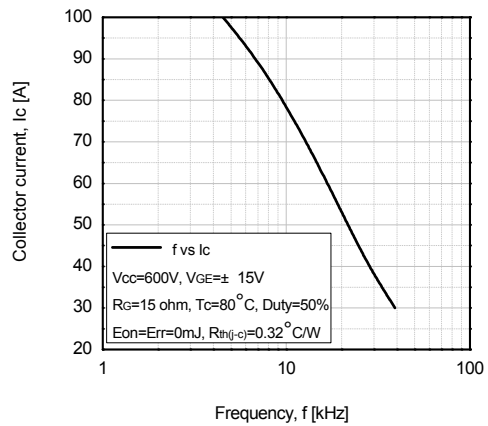


Fig 12. Frequency vs collector current

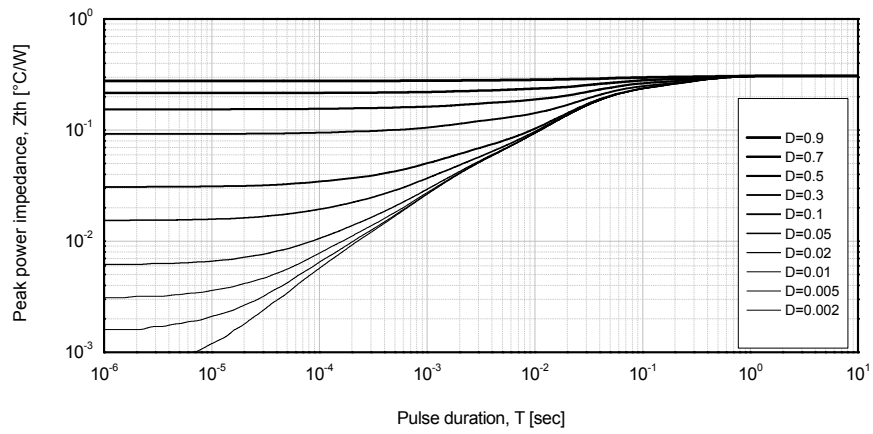


Fig 13. IGBT transient thermal impedance

Package dimension (dimensions in mm)

