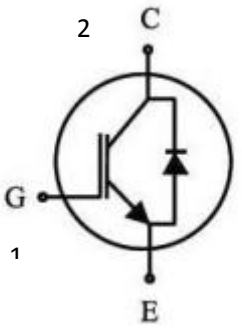
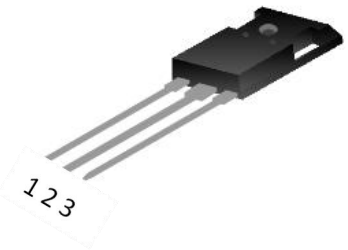
650V Trench and Super Junction IGBT





TO-247-3L

General Description

Super-Semi Trench and Super Junction IGBTs, designed according to the super junction (SJ) technology. The SJ-IGBT series provides low switching losses, high energy efficiency and high avalanche ruggedness for motor control, solar application and welding machine, etc.

Features

- High breakdown voltage to 650V for improved reliability
- Super junction Technology offering :
  - ✧ High speed switching
  - ✧ High ruggedness, temperature stable
  - ✧ Low VCE(sat)
  - ✧ Easy parallel switching capability due to positive temperature coefficient in VCE(sat)
- Enhanced avalanche capability

Applications

- Uninterruptible Power Supply(UPS)
- Power Factor Correction(PFC)
- Welding Converters
- Inverter
- Converter with high switching frequency

V_{CE}	650	V
I_C	75	A
$V_{CE(sat)}$, I_C=75A	1.8	V

Marking Information

Product Name	Package	Marking	Quantity	RoHS
SR75N65G2H2A	TO-247-3L	SR75N65G2H2A	30	Green

Absolute Maximum Ratings（Tj= 25 ℃ unless otherwise specified）

Symbol	Parameter	Value	Unit
V_{CE}	Collector-Emitter Breakdown Voltage	650	V
I_C	DC collector current* -Continuous (T_C = 25℃) -Continuous (T_C = 100℃)	 90 75	A
I_F	Diode Forward current* -Continuous (T_C = 25℃) -Continuous (T_C = 100℃)	 90 75	A
V_{GE}	Continuous Gate-Emitter Voltage	±20	V
	Transient Gate-Emitter Voltage	±30	V
	Turn off safe operating area V_{CE} ≤600V, Tj ≤ 150°C，Tp=1uS	225	A
I_{CM}	Pulsed Collector Current, V_{GE} =15V, tp limited by Tjmax	225	A
t_{SC}	Short Circuit Withstand Time V_{GE}= 15V, V_{CE}≤ 400V, T_C = 150℃	3	μS
T_J	Operating junction temperature	-40 to +175	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃
P_D	Power Dissipation，T_C = 25℃	400	W
M	Mounting torque（TO-247） M3 and M3.5 screws	60	Ncm
	Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s	260	℃

* Current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Max. Value	Unit
$R_{\theta JC}$ (IGBT)	IGBT Thermal Resistance, Junction-to-Case	0.38	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	℃/W

Electrical Characteristics（Tj= 25 ℃ unless otherwise specified）

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 250μA	650	-	-	V
		V_{GE} = 0V, I_C = 1mA	650	-	-	V
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE}, I_C = 250μA	4.0	5.0	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15V, I_C = 75A -T_J = 25℃ -T_J = 150℃	 - -	 1.8 2.4	 2.1 -	 V V
I_{CES}	Zero Gate Voltage Collector Current	V_{CE} = 650V, V_{GE} = 0V -T_J = 25℃ -T_J = 150℃	 - -	 1 1000	 20 -	 μA μA
I_{GES}	Gate-Emitter Leakage Current	V_{CE} = 0V, V_{GE} = ±20V	-	-	100	nA
gFS	Forward Transconductance	V_{CE} = 20V, I_C = 75A	-	40	-	S

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic Characteristics						
Cies	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 250KHz	-	4150	-	pF
Coes	Output Capacitance		-	259	-	pF
Cres	Reverse Transfer Capacitance		-	84	-	pF
Q_G	Gate Charge	V_{CC} = 400V, I_C = 75A, V_{GE} = 15V	-	170	-	nC
$I_{C(SC)}$	Short Circuit Collector Current	V_{GE}=15V, t_{SC}≤5us V_{CC}=400V, $T_{j,start}$=25°C	-	395	-	A
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
Switching Characteristics, Inductive Load, Tj=25℃						
td(on)	Turn-On Delay Time	Vcc = 400V, I_C = 75A V_{GE} = 0V/15V Rg = 10Ω	-	60	-	ns
tr	Turn-On Rise Time		-	47	-	ns
td(off)	Turn-Off Delay Time		-	181	-	ns
tf	Turn-Off Fall Time		-	56	-	ns
Eon	Turn-on Energy		-	1.17	-	mJ
Eoff	Turn-off Energy		-	0.47	-	mJ

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Diode Characteristics and Maximum Ratings, Tj=25℃						
V_{FM}	Diode Forward Voltage	I_F = 30A	-	1.65	2.0	V
Trr	Reverse Recovery Time	VR = 400V, I_F = 75A dI_F/dt =1000A/μs	-	38	-	ns
Irr	Reverse Recovery Current		-	36	-	A
Qrr	Reverse Recovery Charge		-	0.87	-	μC

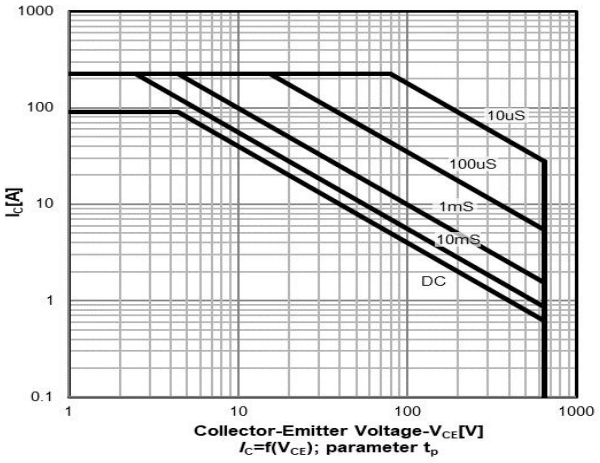
Electrical Characteristics（Tj=150℃ unless otherwise specified）

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Switching Characteristics, Inductive Load, Tj=150℃						
td(on)	Turn-On Delay Time	Vcc = 400V, I_C = 75A V_{GE} = 0V/15V Rg = 10Ω	-	59	-	ns
tr	Turn-On Rise Time		-	52	-	ns
td(off)	Turn-Off Delay Time		-	189	-	ns
tf	Turn-Off Fall Time		-	66	-	ns
Eon	Turn-on Energy		-	1.75	-	mJ
Eoff	Turn-off Energy		-	0.71	-	mJ

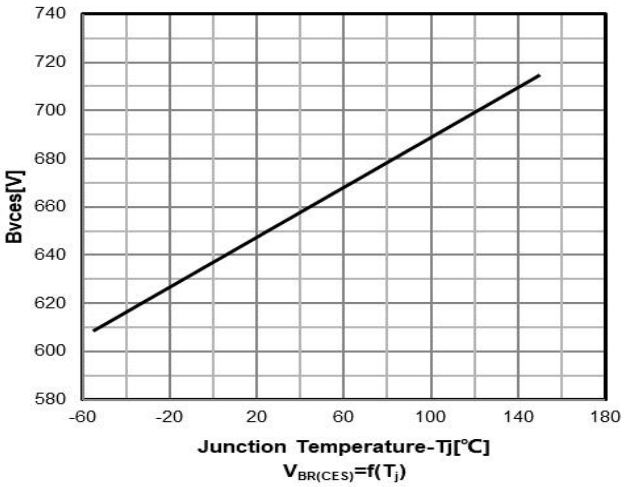
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Diode Characteristics and Maximum Ratings, Tj=150℃						
V_{FM}	Diode Forward Voltage	I_F = 30A	-	1.3	-	V
Trr	Reverse Recovery Time	VR = 400V, I_F = 75A dI_F/dt =1000A/μs	-	150	-	ns
Irr	Reverse Recovery Current		-	43	-	A
Qrr	Reverse Recovery Charge		-	2.55	-	μC

Typical Performance Characteristics

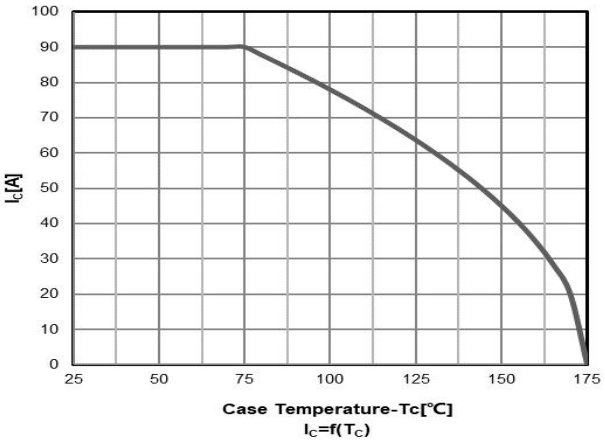
Safe operating area Ta=25 ℃ Non-Full PAK



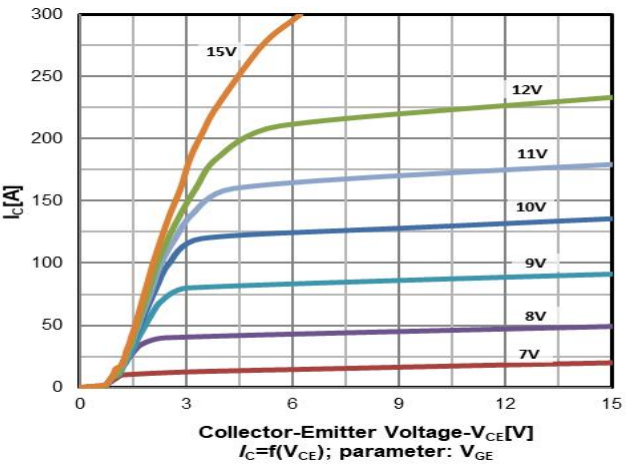
Collector-emitter breakdown voltage vs. temperature



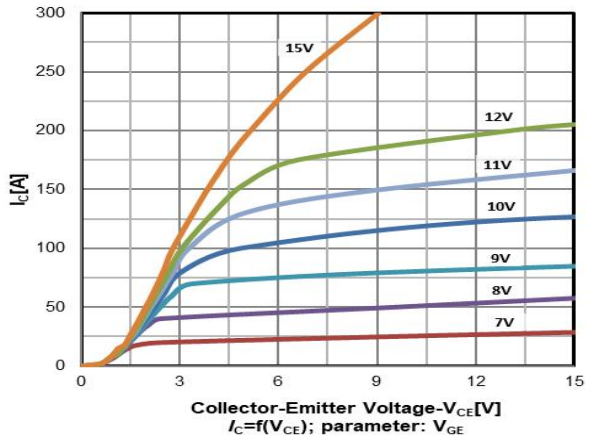
Collector current as a function of Case temperature



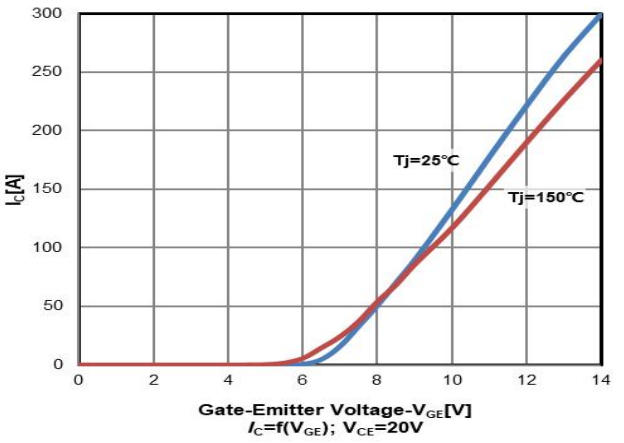
Typ. Output characteristics Tj=25 ℃



Typ. Output characteristics Tj=175 ℃

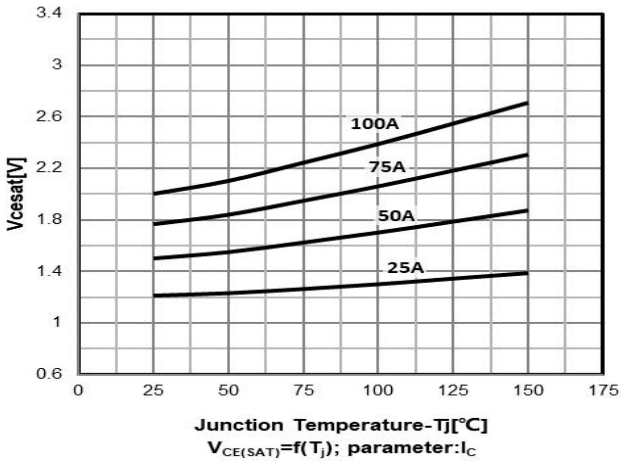


Typ. Transfer characteristics

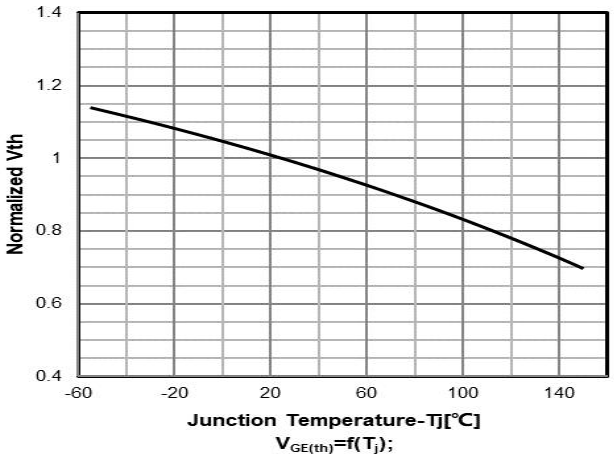


Typical Performance Characteristics

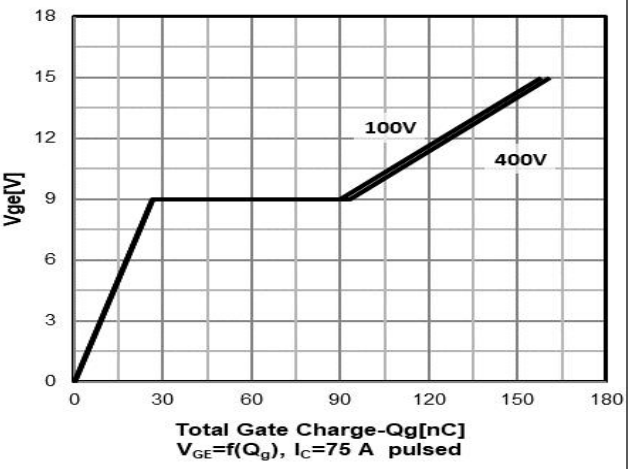
Typ. Collector-emitter saturation voltage as a function of junction temperature (VGE=15V)



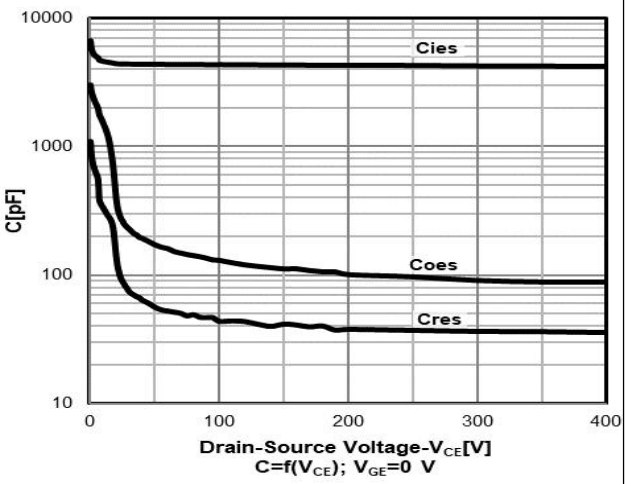
Normalized VGE(th) vs. temperature



Gate charge characteristics

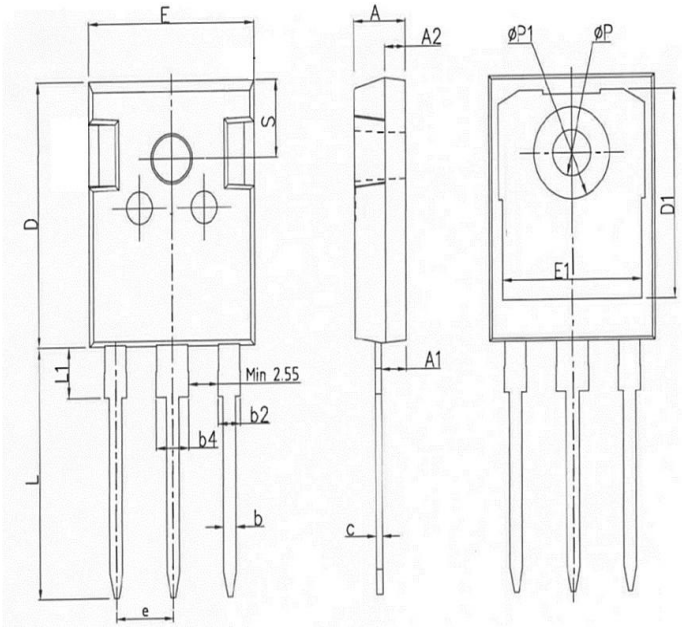


Capacitance characteristics



Package Outline

TO-247-3L UNIT(mm)



SYMBOL	UNIT(mm)		
	MIN	NOM	MAX
A	4.8	5	5.2
A1	2.2	2.4	2.6
A2	1.85	2	2.15
b	1.1	1.2	1.35
b2	1.91	2.04	2.21
b4	2.91	3.04	3.21
c	0.5	0.6	0.75
D	20.7	21	21.3
D1	16.2	16.55	16.9
E	15.5	15.8	16.1
E1	13	13.3	13.6
e	5.44BSC		
L	19.6	19.95	20.3
L1	-	-	4.3
ΦP	3.4	3.6	3.8
ΦP1	-	-	7.5
S	6.15BSC		