

600V Trench and Super Junction IGBT

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.

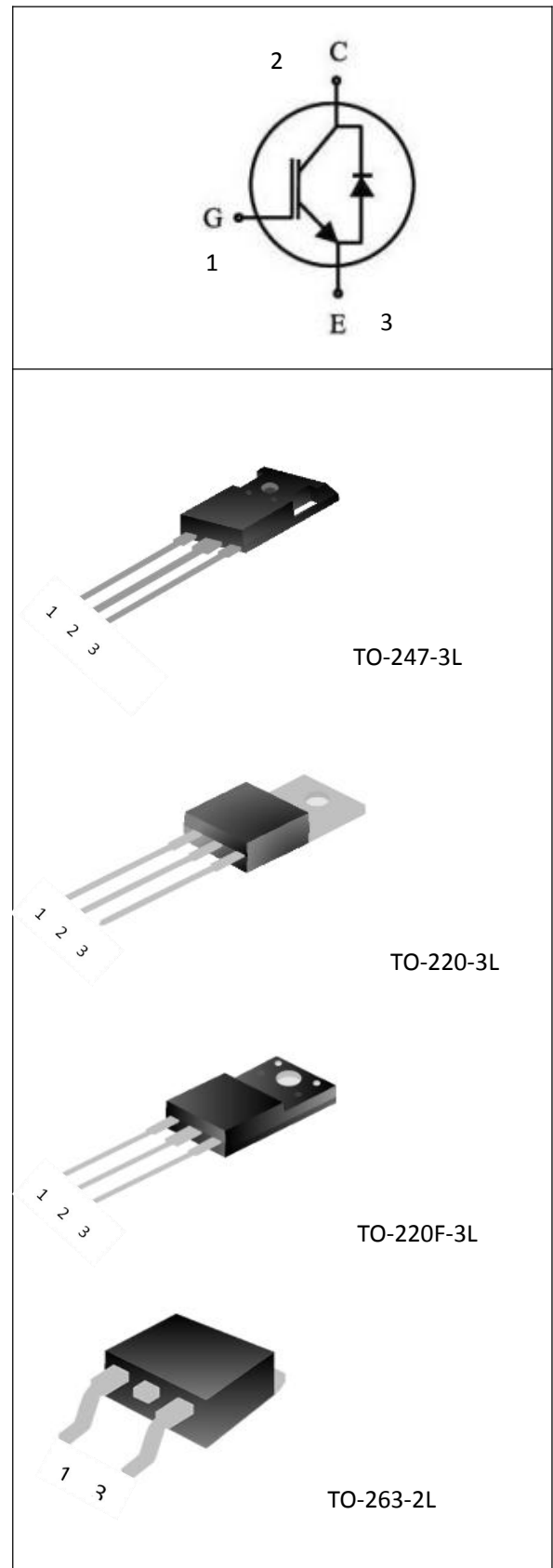
Features

- ◆ High breakdown voltage to 600V for improved reliability
- ◆ Super junction Technology offering :
 - ◇ High speed switching
 - ◇ High ruggedness, temperature stable
 - ◇ Low $V_{CE(sat)}$
 - ◇ Easy parallel switching capability due to positive temperature coefficient in $V_{CE(sat)}$
- ◆ Enhanced avalanche capability

Applications

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

V_{CE}	600	V
I_C	30	A
$V_{CE(sat)}, I_C=30A$	1.7	V





Product Name	Package	Marking	Quantity	RoHS
SR30N60G21BT	TO-220-3L	SR30N60G21BT	50	Green
SR30N60G21BS	TO-263-2L	SR30N60G21BS	800	Green
SR30N60G21BF	TO-220F-3L	SR30N60G21BF	50	Green
SR30N60G21BG	TO-247-3L	SR30N60G21BG	30	Green

Absolute Maximum Ratings (T_j= 25 °C unless otherwise specified)

Symbol	Parameter	Non-FullPAK	Full PAK	Unit
V _{CE}	Collector-Emitter Breakdown Voltage	600		V
I _C	DC collector current*			A
	-Continuous (T _C = 25°C)	60		
	-Continuous (T _C = 100°C)	30		
I _F	Diode Forward current*			A
	-Continuous (T _C = 25°C)	60		
	-Continuous (T _C = 100°C)	30		
V _{GE}	Continuous Gate-Emitter Voltage	±20		V
	Transient Gate-Emitter Voltage	±30		V
I _{CM}	Turn off safe operating area V _{CE} ≤ 600V, T _j ≤ 150°C, T _p =1uS	90		A
	Pulsed Collector Current, V _{GE} = 15V, t _p limited by T _{jmax}	90		A
T _{SC}	Short Circuit Withstand Time V _{GE} = 15V, V _{CE} ≤ 400V, T _C = 150°C	3		μS
T _J	Operating junction temperature	-40 to +175		°C
T _{STG}	Storage Temperature Range	-55 to +150		°C
P _D	Power Dissipation, T _C = 25°C	170	31	W
	Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s	260		°C

* Current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Max. Value		Unit
R _{θJC} (IGBT)	IGBT Thermal Resistance, Junction-to-Case	0.88	4.8	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	40	80	°C/W

Electrical Characteristics (T_j= 25 °C unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 250μA	600	-	-	V
		V _{GE} = 0V, I _C = 1mA	600	-	-	V
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CEr} , I _C = 250μA	4.0	5.0	6.0	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 30A	-	1.7	2.0	V
		-T _j = 25°C -T _j = 150°C	-	2.1	-	V
I _{CES}	Zero Gate Voltage Collector Current	V _{CE} = 600V, V _{GE} = 0V	-	0.1	20	μA
		-T _j = 25°C -T _j = 150°C	-	-	1000	μA
I _{GES}	Gate-Emitter Leakage Current	V _{CE} = 0V, V _{GE} = ±20V	-	-	100	nA
g _{FS}	Forward Transconductance	V _{CE} = 20V, I _C = 30A	-	16	-	S

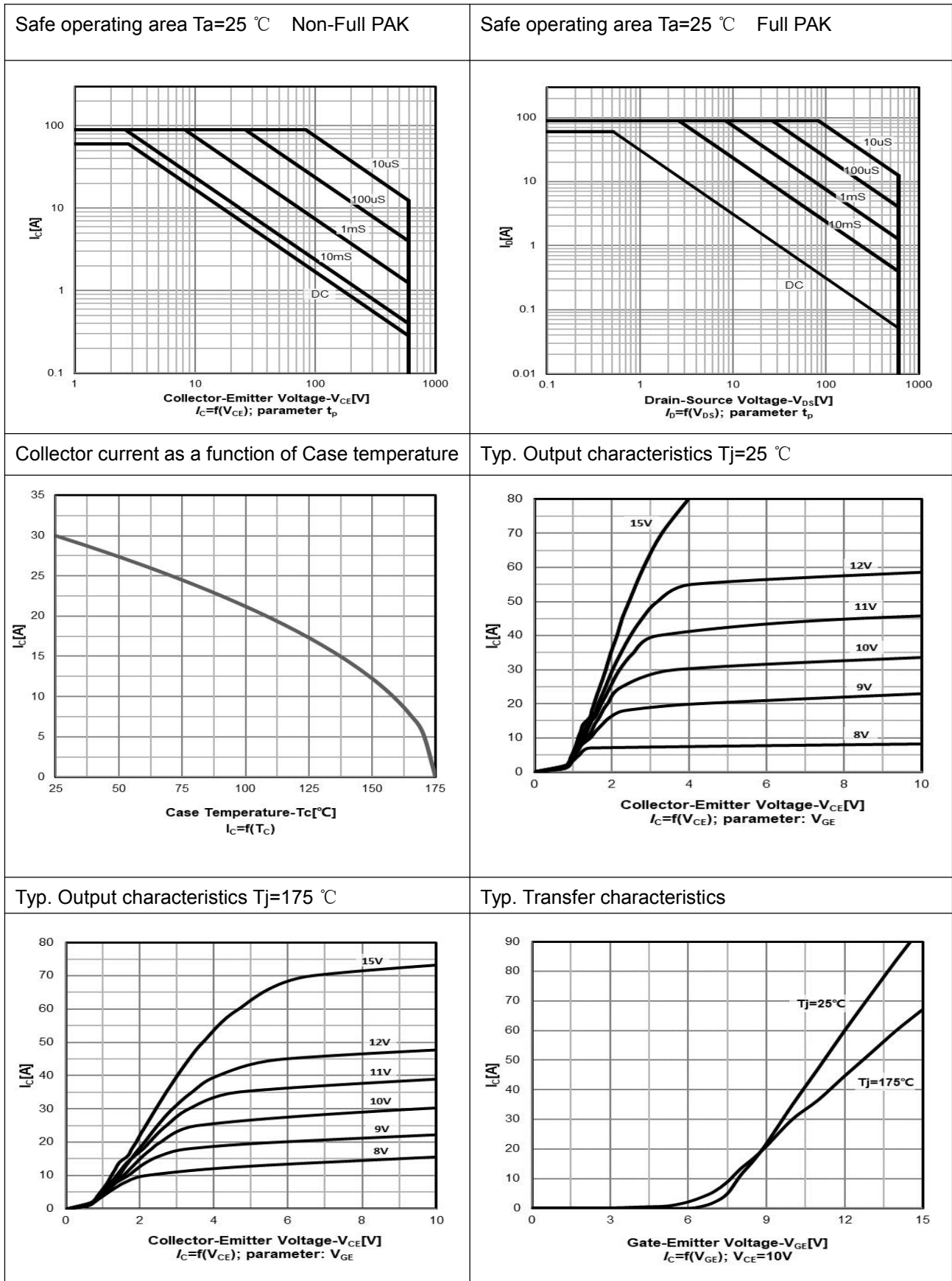
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 1.0MHz	-	1770	-	pF
C _{oes}	Output Capacitance		-	82	-	pF
C _{res}	Reverse Transfer Capacitance		-	12	-	pF
Q _G	Gate Charge	V _{CC} = 400V, I _C = 30A, V _{GE} = 15V	-	60	-	nC
I _{C(SC)}	Short Circuit Collector Current	V _{GE} =15V, t _{SC} ≤5us V _{CC} =400V, T _{j,start} =25°C	-	130	-	A

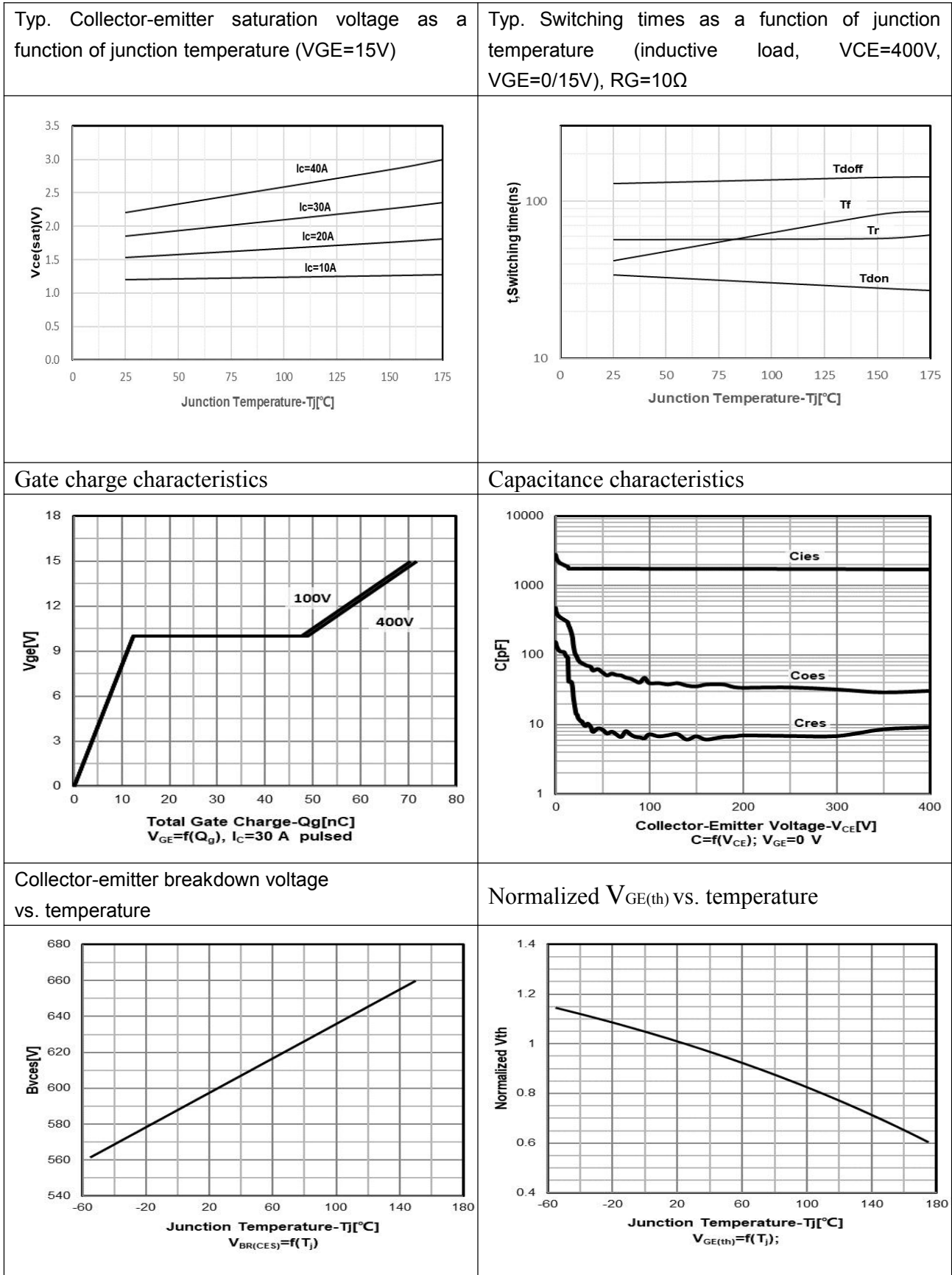
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Switching Characteristics, Inductive Load, T_j=25°C						
td(on)	Turn-On Delay Time	V _{CC} = 400V, I _C = 30A V _{GE} = 0V/15V R _g = 10Ω	-	28	-	ns
tr	Turn-On Rise Time		-	41	-	ns
td(off)	Turn-Off Delay Time		-	87	-	ns
tf	Turn-Off Fall Time		-	148	-	ns
E _{on}	Turn-on Energy		-	0.89	-	mJ
E _{off}	Turn-off Energy		-	0.41	-	mJ

Electrical Characteristics (T_j= 25 °C unless otherwise specified)

Switching Characteristics, Inductive Load, T_j=150°C						
td(on)	Turn-On Delay Time	V _{CC} = 400V, I _C = 30A V _{GE} = 0V/15V R _g = 10Ω	-	32	-	ns
tr	Turn-On Rise Time		-	40	-	ns
td(off)	Turn-Off Delay Time		-	79	-	ns
tf	Turn-Off Fall Time		-	184	-	ns
Eon	Turn-on Energy		-	1.18	-	mJ
Eoff	Turn-off Energy		-	0.65	-	mJ

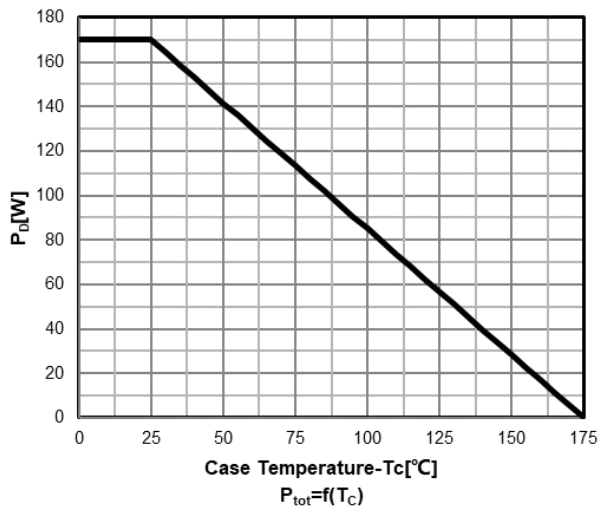
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Diode Characteristics and Maximum Ratings, T_j=25°C						
V _{FM}	Diode Forward Voltage	I _F = 15A	-	1.3	1.6	V
		I _F = 30A	-	1.5	1.9	V
T _{rr}	Reverse Recovery Time	VR = 400V, I _F = 15A dI _F /dt =100A/μs	-	32	-	ns
I _{rr}	Reverse Recovery Current		-	27	-	A
Q _{rr}	Reverse Recovery Charge		-	0.41	-	μC
T _{rr}	Reverse Recovery Time	VR = 400V, I _F = 30A dI _F /dt =100A/μs	-	32	-	ns
I _{rr}	Reverse Recovery Current		-	18	-	A
Q _{rr}	Reverse Recovery Charge		-	0.28	-	μC
Diode Characteristics and Maximum Ratings, T_j=150°C						
V _{FM}	Diode Forward Voltage	I _F = 15A	-	1.15	1.5	V
		I _F = 30A	-	1.35	1.7	V
T _{rr}	Reverse Recovery Time	VR = 400V, I _F = 15A dI _F /dt =100A/μs	-	45	-	ns
I _{rr}	Reverse Recovery Current		-	26	-	A
Q _{rr}	Reverse Recovery Charge		-	0.66	-	μC
T _{rr}	Reverse Recovery Time	VR = 400V, I _F = 30A dI _F /dt =100A/μs	-	117	-	ns
I _{rr}	Reverse Recovery Current		-	19	-	A
Q _{rr}	Reverse Recovery Charge		-	1.37	-	μC

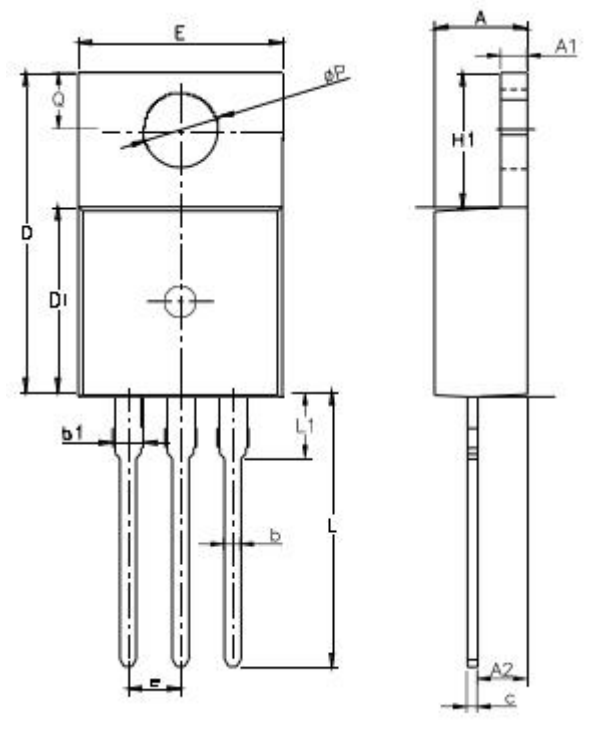
Typical Performance Characteristics


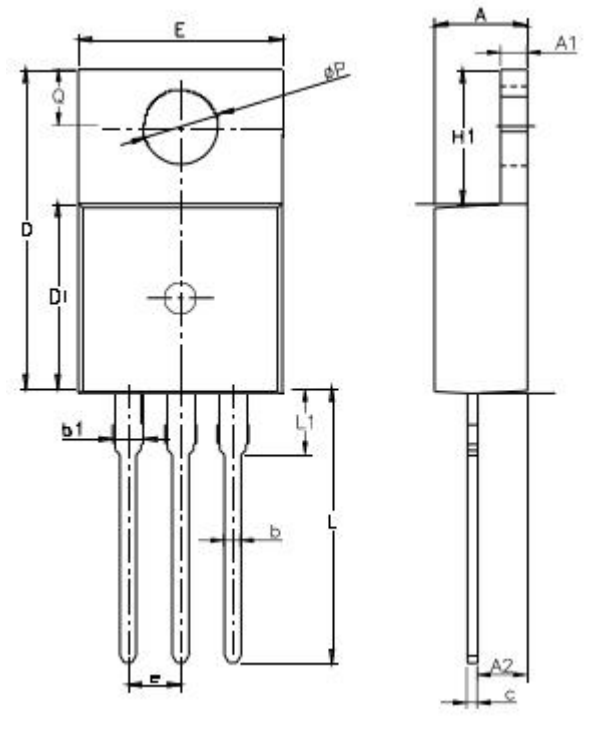
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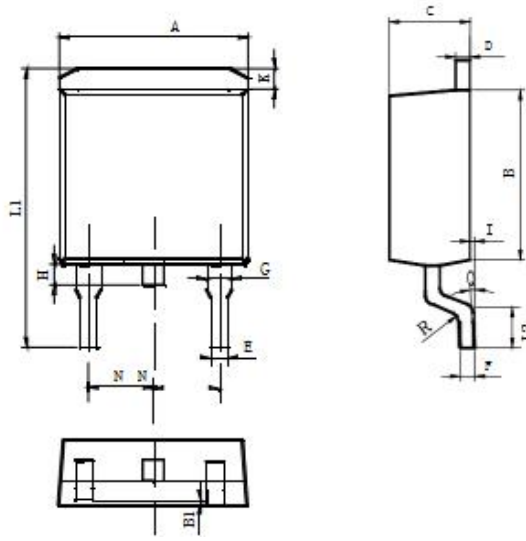
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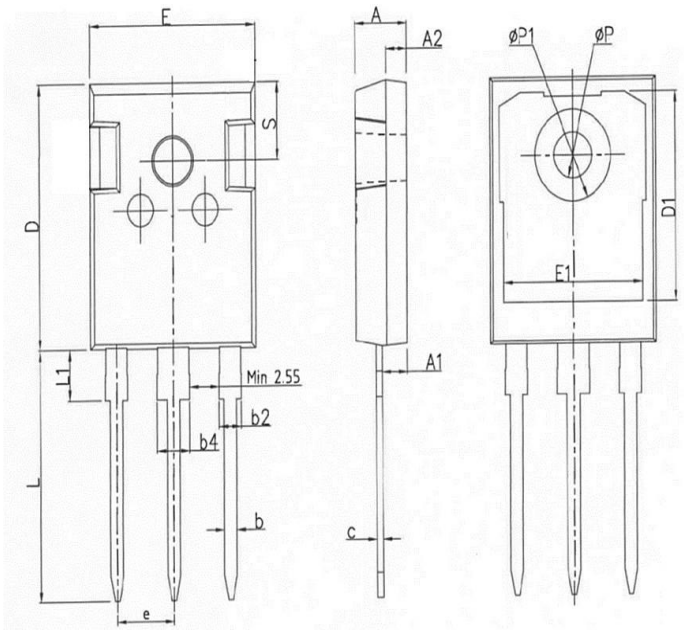
Power dissipation



TO-220 Full PAK		UNIT(mm)																																																																						
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TO-263-2L		UNIT(mm)		
	Items	Values(mm)		
		MIN	NOM	MAX
	A	9.8	10	10.4
	B	8.9	9.6	9.5
	B1	0	-	0.1
	C	4.4	4.5	4.8
	D	1.16	1.4	1.5
	E	0.7	0.75	0.95
	F	0.3	0.45	0.6
	G	1.07	1.38	1.47
	H	1.3	-	1.8
	K	0.95	1	1.37
	L1	14.5	15.2	16.5
	L2	1.6	2	2.3
I	0	-	0.2	
Q	0°	3°	8°	
R	0.4			
N	2.35	2.4	2.7	

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		