

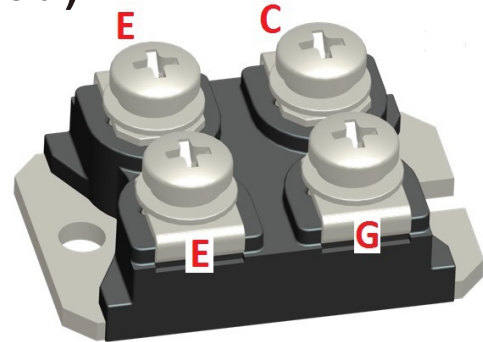
Nell High Power Products

Insulated Gate Bipolar Transistor

100A / 1200V (Medium Speed)

FEATURES

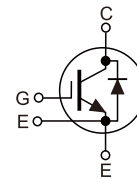
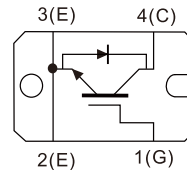
- Trench Field Stop IGBT Technology
- Square RBSOA
- Ultra low saturation voltage:
 $V_{CE(sat)} = 2.00V(\text{typ.}) @ I_C = 100A, V_{GE} = 15V, T_J = 25^\circ C$
- Fully isolated in SOT-227 package
- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- $T_J = 175^\circ C$
- Suitable for working up to 40KHz
- Minimized internal stray inductance



APPLICATIONS

- Uninterruptible Power Supplies
- Inverters
- Welders
- High power converters
- Motor drives
- Air conditioning systems
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers

Equivalent Circuit



G = Gate , C = Collector , E = Emitter

*Either emitter terminal can be used as Main or Kelvin Emitter.

ABSOLUTE MAXIMUM RATINGS (at $T_C = 25^\circ C$ unless otherwise specified)

SYMBOL	PARAMETER AND TEST CONDITIONS		VALUE	UNIT
V_{CES}	Collector to emitter voltage (G-E short)		1200	V
V_{GES}	Gate to emitter voltage (C-E short)		± 30	V
I_C	DC collector current	$T_C = 100^\circ C$	100	A
		$T_C = 25^\circ C$	200	
t_{SC}^1	Minimum short circuit withstand time, $V_{GE} = \pm 15V, V_{CC} \leq 800V, T_J = 150^\circ C$		10	μS
P_D	Maximum power dissipation	$T_J = 25^\circ C$	833	W
T_J	Operation junction temperature		-55 to 175	$^\circ C$
T_{stg}	Storage temperature range		-55 to 175	
V_{ISO}	Isolation voltage (Terminal to Base, AC, $f=60Hz$, 1 minute)		2500	$V_{(RMS)}$
F_T	Mounting torque	Module base to heatsink, M4	1.1	N.m
		Busbar to terminal, M4	1.1	

Notes:

1. Allowed number of short circuits: <1000; time between short circuits: >1s.

THERMAL RESISTANCE

SYMBOL	PARAMETER AND TEST CONDITIONS	VALUE			UNIT
		MIN.	TYP.	MAX.	
$R_{th(j-c)}$	Thermal resistance, junction to case	-	-	0.18	°C/W
$R_{th(c-h)}$	Thermal resistance, case to heatsink	-	0.05	-	
W_t	Weight	-	30(1.06)	-	g (oz.)

⊙ ELECTRICAL CHARACTERISTIC OF IGBT (at $T_J = 25^{\circ}\text{C}$, unless otherwise specified)

STATIC CHARACTERISTIC

SYMBOL	PARAMETER	TEST CONDITIONS		VALUE			UNIT
				Min.	TYP.	MAX.	
I _{CES}	Collector to Emitter cut-off current	V _{CE} = 1200V, V _{GE} = 0V		-	-	10	μA
I _{GES}	Gate to emitter leakage current	V _{GE} = V _{GES} , V _{CE} = 0V		-	-	100	nA
V _{(BR)CES}	Collector to emitter breakdown voltage	V _{GE} = 0V, I _C = 250μA		1200	-	-	V
V _{CE(sat)}	Collector to emitter saturation voltage	V _{GE} = 15V, I _C = 100A	T _C = 25 °C	-	2.00	2.30	
			T _C = 150 °C	-	2.40	-	
			T _C = 175 °C	-	2.45	-	
V _{GE(th)}	Gate to emitter threshold voltage	V _{CE} = V _{GE} , I _C = 3.8mA		5.2	-	6.5	

DYNAMIC CHARACTERISTIC

SYMBOL	PARAMETER	TEST CONDITIONS	VALUE			UNIT
			Min.	TYP.	MAX.	
C_{ies}	Input capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$	-	9600	-	pF
C_{oes}	Output capacitance		-	410	-	
C_{res}	Reverse transfer capacitance		-	105	-	
Q_g	Gate charge	$V_{CE} = 600\text{V}, I_C = 100\text{A}, V_{GE} = 15\text{V}$	-	280	-	nC
g_{fs}	Forward transconductance	$I_C = 100\text{A}, V_{CE} = 20\text{V}$	60	85	-	S

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SWITCHING CHARACTERISTIC						
SYMBOL	PARAMETER	TEST CONDITIONS	VALUE			UNIT
			Min.	TYP.	MAX.	
$t_{d(on)}$	Turn-on delay time	$V_{CE} = 600V, I_C = 100A, V_{GE} = \pm 15V$ $R_G = 1.5\Omega$, inductive load, $T_J = 25^\circ C$	-	140	-	nS
t_r	Rise time		-	30	-	
$t_{d(off)}$	Turn-off delay time		-	220	-	
t_f	Fall time		-	150	-	
$t_{d(on)}$	Turn-on delay time	$V_{CE} = 600V, I_C = 100A, V_{GE} = \pm 15V$ $R_G = 1.5\Omega$, inductive load, $T_J = 125^\circ C$	-	153	-	
t_r	Rise time		-	33	-	
$t_{d(off)}$	Turn-off delay time		-	260	-	
t_f	Fall time		-	205	-	
E_{on}	Turn-on energy loss per pulse	$V_{CE} = 600V, I_C = I_E = 100A, V_{GE} = \pm 15V$ $R_G = 1.5\Omega, L_S = 100nH$, inductive load, $T_J = 25^\circ C$	-	2.0	-	mJ
E_{off}	Turn-off energy loss per pulse		-	5.5	-	
E_{on}	Turn-on energy loss per pulse	$V_{CE} = 600V, I_C = I_E = 100A, V_{GE} = \pm 15V$ $R_G = 1.5\Omega, L_S = 100nH$, inductive load, $T_J = 150^\circ C$	-	3.6	-	
E_{off}	Turn-off energy loss per pulse		-	8.6	-	
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE} = 15V, V_{CC} = 800V$ $R_g = 1.5\Omega, V_{CE(max)} \leq 1200V, T_J = 150^\circ C$	-	500	-	A

© ELECTRICAL CHARACTERISTIC OF DIODE (at $T_J = 25^\circ C$, unless otherwise specified)

SYMBOL	PARAMETER	TEST CONDITIONS		VALUE			UNIT
				Min.	TYP.	MAX.	
V_{FM}	Forward voltage drop	$I_F = 100A, V_{CE} = 0V$	$T_C = 25^\circ C$	-	1.70	2.0	V
			$T_C = 150^\circ C$	-	1.50	-	
t_{rr}	Reverse recovery time	$I_F = 0.5A, I_r = 1A, I_{rr} = 0.25A$		-	300	-	nS
		$I_F = 100A, V_{CE} = 600V$ $L_S = 110nH, di/dt = 3400A/us$	$T_C = 25^\circ C$	-	105	-	
			$T_C = 150^\circ C$	-	130	-	
E_{rec}	Reverse recovery energy loss per pulse	$I_F = 100A, V_{CE} = 600V$ $L_S = 110nH, di/dt = 3400A/us$	$T_C = 25^\circ C$	-	0.3	-	mJ
			$T_C = 150^\circ C$	-	0.7	-	

Ordering Information Tabel

Device code

N	ST	100	GA	120	M
①	②	③	④	⑤	⑥

- ① - Nell High Power Products
- ② - Package indicator (SOT-227)
- ③ - Current rating(A): I_C , 100=100A
- ④ - Circuit type, GA=single IGBT with Anti-Parallel diode
- ⑤ - Voltage code(V), V_{CES} = code x 10
- ⑥ - Switching speed,"M" for medium speed (up to 40KHz)

Fig.1 Typical Output Characteristics

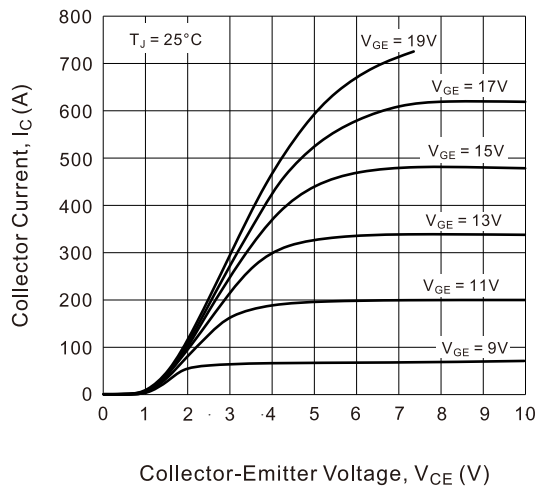
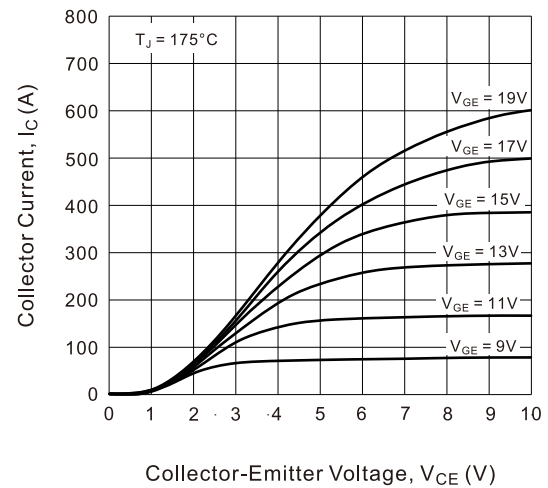


Fig.2 Typical Output Characteristics



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Fig.3 Typical Saturation Voltage Characteristics

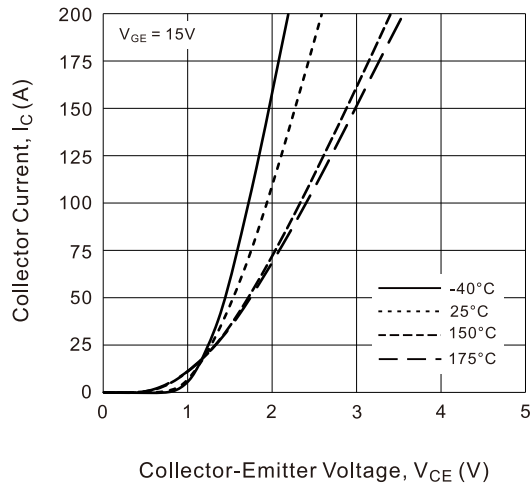


Fig.4 Typical Transfer Characteristics

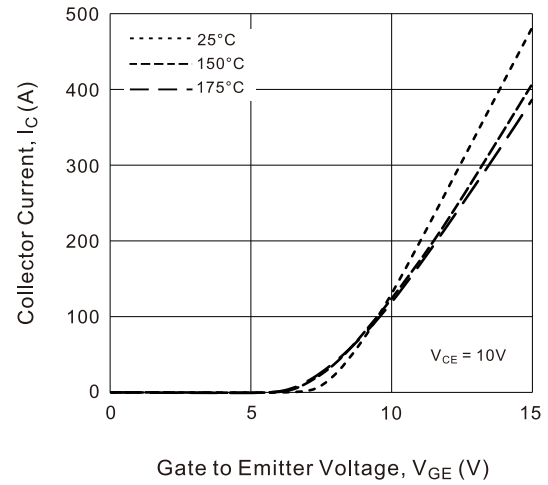


Fig.5 Typical Forward Characteristics of Free Wheeling Diode

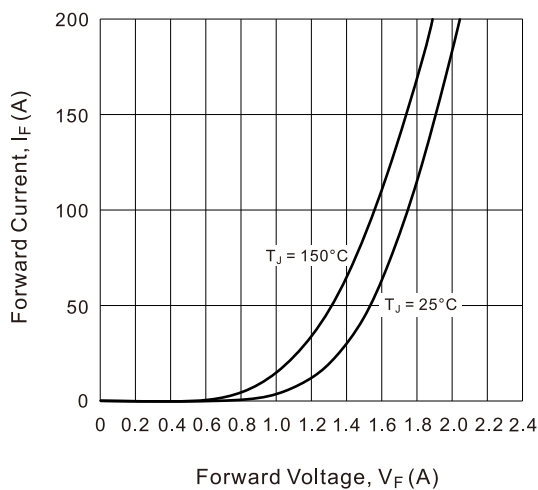


Fig.6 Typical Collector Current vs. Switching Loss

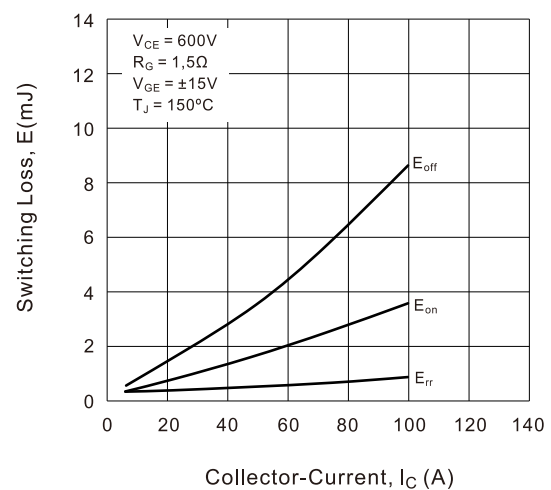


Fig.7 Reverse Bias Safe Operating Area

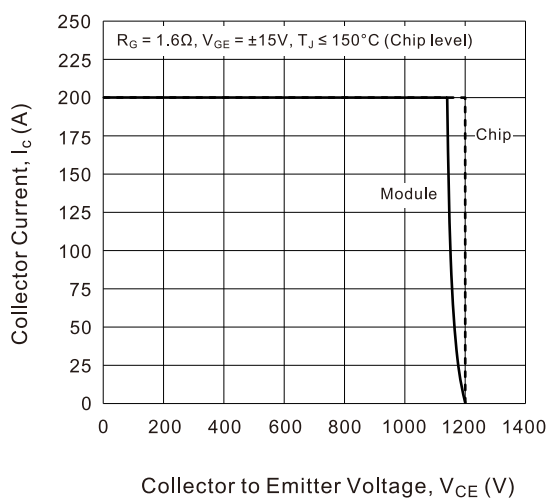
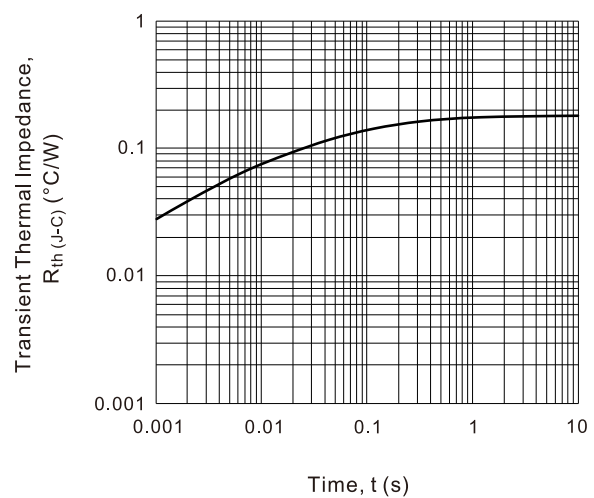


Fig.8 Transient Thermal Impedance



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Fig.9 Transconductance

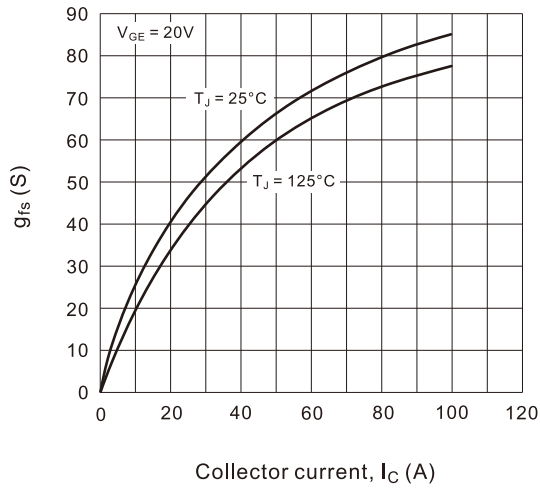
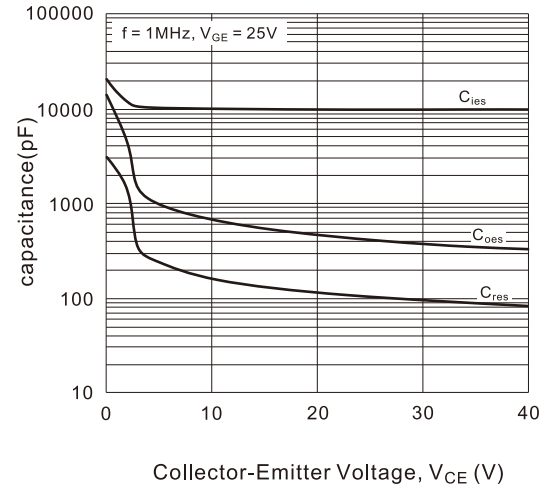


Fig.10 Typical Capacitance



SOT-227 Module

