

Nell High Power Products

IGBT Module-Dual 150A / 1200V

FEATURES

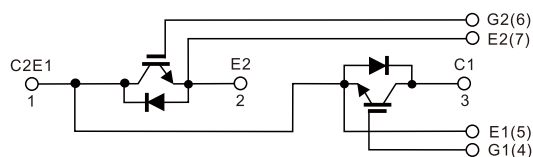
- Square RBSOA
- Ultra low saturation voltage:
 $V_{CE(sat)} = 1.75V(\text{typ.}) @ I_C = 150A, V_{GE} = 15V, T_J = 25^\circ C$
- High speeding switching
- Less power dissipation
- Low switching losses
- $T_{vj(op)} = 150^\circ C$
- Suitable for working up to 20KHz
- Minimized internal stray inductance



APPLICATIONS

- Uninterruptible Power Supplies
- Inverters
- Welders
- High power converters
- Motor drives

Equivalent Circuit



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	$T_C = 100^\circ C$	150	A
I_{CM}^1	Pulsed collector current (Pulse $\leq 1ms$)	$T_C = 25^\circ C$	300	
I_F	Diode forward current (DC)	$T_C = 25^\circ C$	150	
I_{FM}^1	Maximum diode pulsed forward current (Pulse $\leq 1ms$)		300	
t_{SC}^2	Minimum short circuit withstand time, $V_{GE} = 15V, V_{CC} \leq 720V, T_J = 150^\circ C$		10	μS
P_D	Maximum power dissipation	$T_J = 25^\circ C$	660	W
T_J	Operation junction temperature		-40 to 150	$^\circ C$
T_{stg}	Storage temperature range		-40 to 125	
V_{ISO}	Isolation voltage (Terminal to Base, AC, $f=60Hz$, 1 minute)		3500	$V_{(RMS)}$
F_T	Mounting torque	Module base to heatsink, M6	3.0	N.m
		Busbar to terminal, M5	2.0	

Notes:

1. Repetitive rating: Pulse width limited by max. junction temperature.
2. Allowed number of short circuits: <1000 ; time between short circuits: $>1s$.

THERMAL RESISTANCE					
SYMBOL	PARAMETER AND TEST CONDITIONS	VALUE			UNIT
		MIN.	TYP.	MAX.	
$R_{th(j-c)}$	IGBT thermal resistance, junction to case (per leg)	-	-	0.19	°C/W
$R_{th(j-c)}$	Diode thermal resistance, junction to case (per leg)	-	-	0.32	
$R_{th(c-h)}$	IGBT thermal resistance, case to heatsink (per leg)	-	0.08	-	
$R_{th(c-h)}$	Diode thermal resistance, case to heatsink (per leg)	-	0.14	-	
W_t	Weight	-	150(5.3)	-	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	$V_{CE} = 1200\text{V}, V_{GE} = 0\text{V}$	-	-	10	μA
I_{GES}	Gate to emitter leakage current	$V_{GE} = V_{GES}, V_{CE} = 0\text{V}$	-	-	100	nA
$V_{(BR)CES}$	Collector to emitter breakdown voltage	$V_{GE} = 0\text{V}, I_C = 250\mu\text{A}$	1200	-	-	V
$V_{CE(sat)}$	Collector to emitter saturation voltage	$V_{GE} = 15\text{V}, I_C = 150\text{A}$	-	1.75	2.00	
		$T_C = 125^{\circ}\text{C}$		2.00	-	
$V_{GE(th)}$	Gate to emitter threshold voltage	$V_{CE} = 10\text{V}, I_C = 1\text{mA}$	5.0	-	6.5	

DYNAMIC CHARACTERISTIC						
SYMBOL	PARAMETER	TEST CONDITIONS	VALUE			UNIT
			Min.	TYP.	MAX.	
C_{ies}	Input capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$	-	11500	-	pF
C_{oes}	Output capacitance		-	750	-	
C_{res}	Reverse transfer capacitance		-	400	-	
Q_g	Gate charge	$V_{CE} = 600\text{V}, I_C = 150\text{A}, V_{GE} = -15\text{V} \sim +15\text{V}$	-	1200	-	nC

SWITCHING CHARACTERISTIC						
SYMBOL	PARAMETER	TEST CONDITIONS	VALUE			UNIT
			Min.	TYP.	MAX.	
$t_{d(on)}$	Turn-on delay time	$V_{CE} = 600\text{V}, I_C = 150\text{A}, V_{GE} = \pm 15\text{V}$ $R_G = 1.1\Omega$, inductive load, $T_J = 25^{\circ}\text{C}$	-	-	450	nS
t_r	Rise time		-	-	120	
$t_{d(off)}$	Turn-off delay time		-	-	500	
t_f	Fall time		-	-	250	
E_{on}	Turn-on energy loss per pulse	$V_{CE} = 600\text{V}, I_C = I_E = 150\text{A}, V_{GE} = \pm 15\text{V}$ $R_G = 1.1\Omega, L_S = 30\text{nH}, dv/dt = 3400\text{V}/\mu\text{s}$ inductive load, $T_J = 150^{\circ}\text{C}$	-	18.0	-	mJ
E_{off}	Turn-off energy loss per pulse		-	18.5	-	
E_{rec}	Reverse recovery energy per pulse		-	9.5	-	

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

SYMBOL	PARAMETER	TEST CONDITIONS		VALUE			UNIT
				Min.	TYP.	MAX.	
V _{FM}	Maximum diode forward voltage	I _F = 150A, V _{GE} = 0V	T _J = 25 °C	-	1.90	2.2	V
			T _J = 125 °C	-	1.70	-	
			T _J = 150 °C	-	1.70	-	
t _{rr}	Diode reverse recovery time	I _F = 0.5A, I _R = 1.0A, I _{RR} = 0.25A	T _C = 25 °C	-	140	-	nS
		V _R = 600V, I _F = 150A, V _{GE} = ±15V, di/dt = 2000A/μs, R _G = 3.9Ω		-	-	400	
Q _{rr}	Diode reverse recovery charge				-	12	-
R _{CC'+EE'}	Internal lead resistance	Main terminal to chip (per leg)		-	-	1	mΩ
L _{SCE}	Stray inductance	Main terminal 3 to 2		-	30	-	nH

Ordering Information Tabel

Device code

NSGM	150	GB	120	A	S
①	②	③	④	⑤	⑥

- ① - NSGM: for Nell's IGBT Module
- ② - Current rating(A): I_C
- ③ - Circuit type, Dual IGBT with Anti-Parallel FRED(FWD)
- ④ - Voltage code(V), $V_{CES} = \text{code} \times 10$
- ⑤ - Case style, "A" for 34 mm IAP Package
- ⑥ - Switching speed, "S" for standard speed (below 20KHz)

Nell High Power Products

Fig.1 Typical Output Characteristics

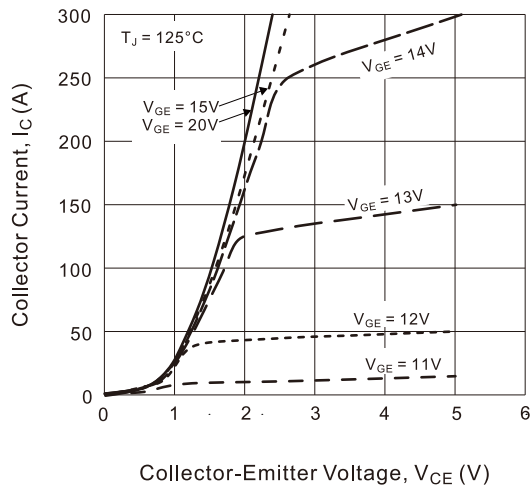


Fig.2 Typical Saturation Voltage Characteristics

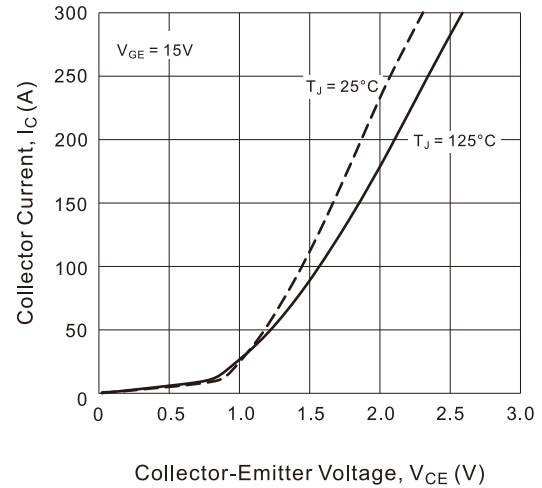


Fig.3 Typical Transfer Characteristics

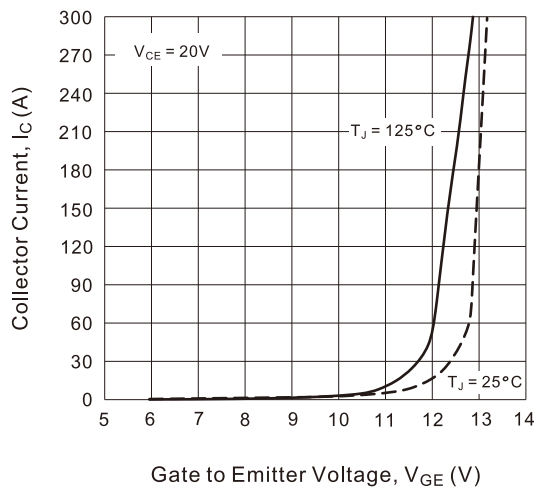


Fig.4 Typical Forward Characteristics of Free Wheeling Diode

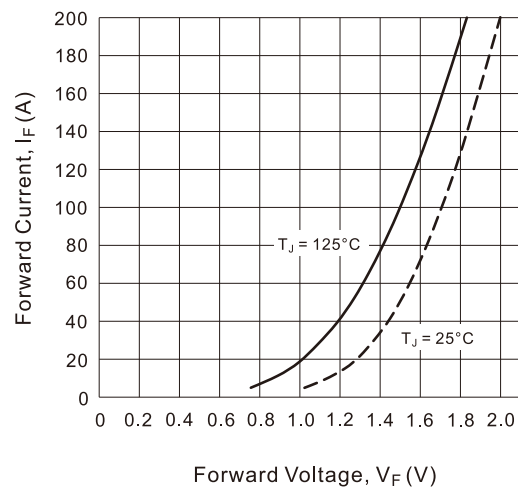


Fig.5a Typical Collector Current vs. Switching Loss

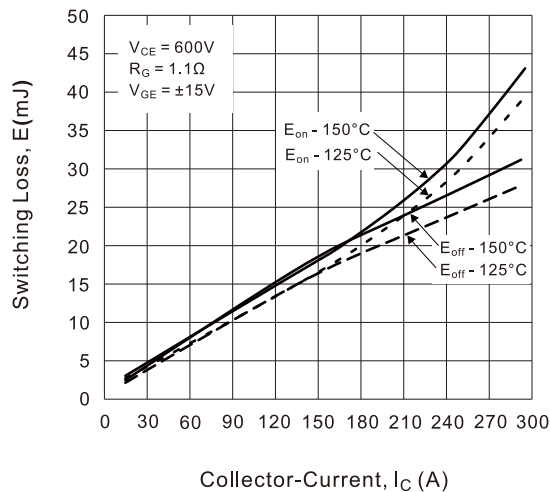


Fig.5b Typical Collector Current vs. Switching Loss

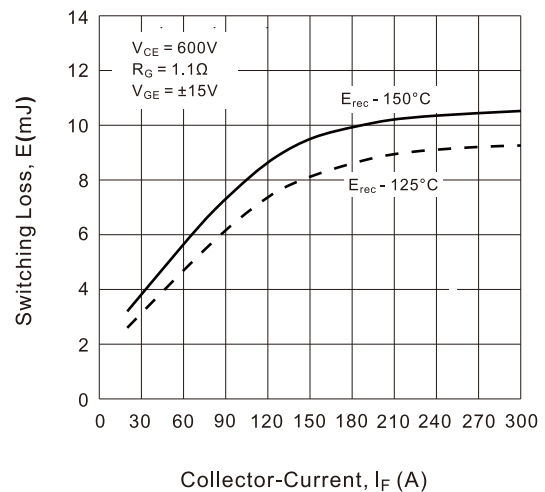


Fig.6a Typical Series Gate Impedance vs. Switching Loss

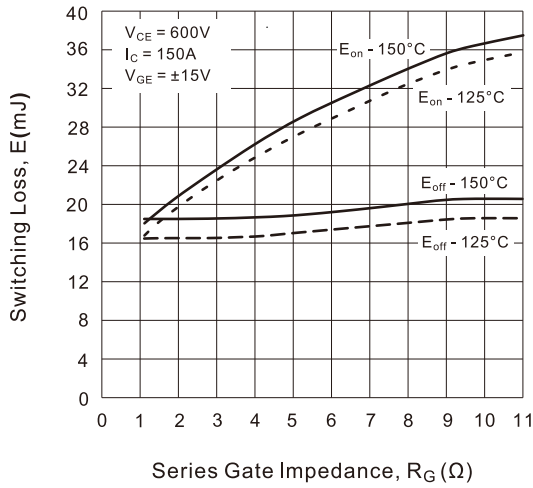


Fig.6b Typical Series Gate Impedance vs. Switching Loss

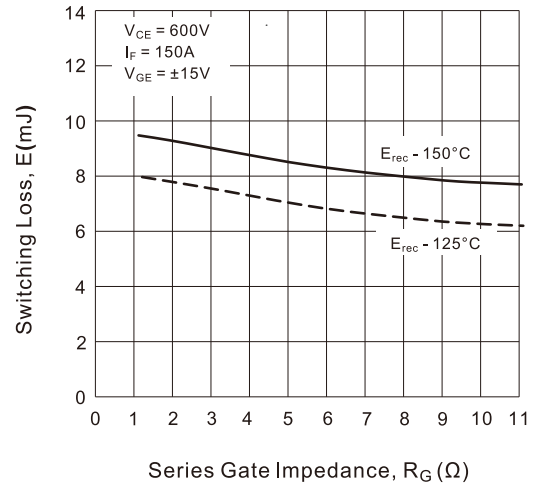


Fig.7 Reverse Bias Safe Operating Area

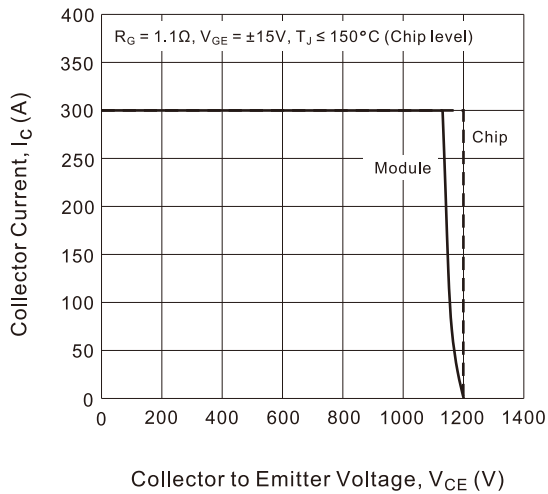
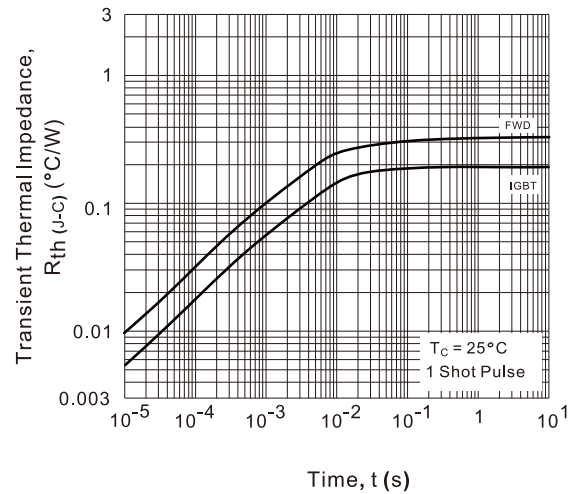
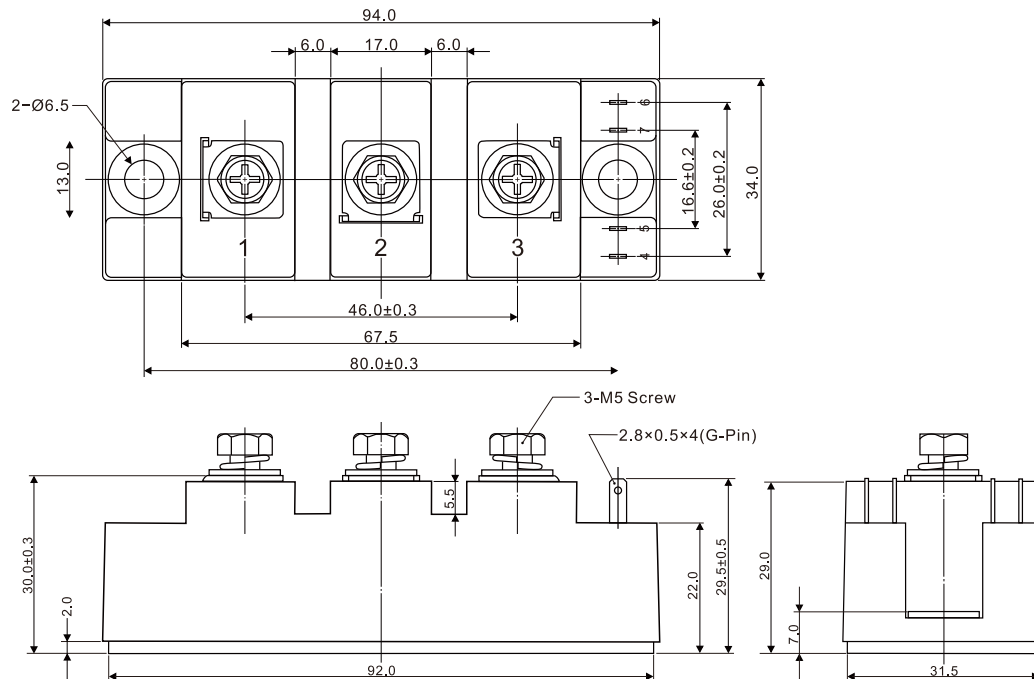


Fig.8 Transient Thermal Impedance





All dimensions in millimeters