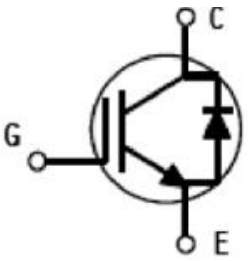
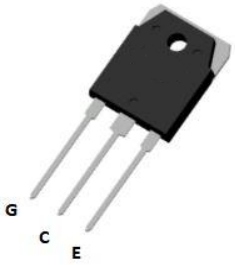
1 Description

Using ChipNobo's proprietary Trench design and advance FS technology, the 650V FS IGBT offers superior and switching performances, high avalanche ruggedness easy parallel operation.



2 Features

- FS Trench Technology, Positive temperature coefficient
- Low saturation voltage: VCE(sat), typ = 2.0V @ I_C =50A and T_j =25°C
- Extremely enhanced avalanche capability



3 Applications

- Welding
- UPS
- Three-level Inverter

Type	V_{CE}	Ic	Vcesat,T_j=25℃	T_{jmax}	Package
SGH80N60UFD-CN	650V	50A	2.0V	175℃	TO-3PN

4 Electrical Characteristics

4.1 Absolute Maximum Ratings （Tj=25℃，unless otherwise noted）

Parameter		Symbol	Value	Units
Collector-to-Emitter Voltage		V_{CE}	650	V
Gate-to-Emitter Voltage		V_{GE}	±30	V
DC Collector current	T_j=25℃	I_C	100	A
	T_j=100℃		50	A
Pulsed Collector Current(1)		I_{CM}	200	A
Diode forward current	T_j=25℃	I_F	40	A
	T_j=100℃		20	
Diode Pulsed Current		I_{FM}	80	A
Short circuit withstand time，V_{GE}=15V，V_{CC}=400V，Tj=150℃		T_{SC}	6	μs
Power Dissipation	T_j=25℃	P_{tot}	320	W
	T_j=100℃		160	W
Junction Temperature Range		T_j	-45～175	℃
Storage Temperature Range		T_{stg}	-45～150	℃
Soldering temperature		T_L	260	℃

4.2 Thermal Characteristics

Parameter	Symbol	Rating	Units
IGBT Thermal Resistance,Junction to Case-sink	R_{thJC}	0.47	℃/W
IGBT Thermal Resistance,Junction to Ambient	R_{thJA}	39.2	℃/W
Diode Thermal Resistance,Junction to Case-sink	R_{thJC}	1.2	℃/W

4.3 Electrical Characteristics （T_j=25℃， unless otherwise noted）

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Off Characteristics						
Collector-to-Emitter Breakdown Voltage	V_{CE}	I_C=1mA,V_{GE}=0V	650	--	--	V
Collector-to-Emitter Leakage Current	I_{CES}	V_{CE}=650V,V_{GE}=0V	--	--	1	μA
Gate-to-Emitter Leakage Current	I_{GES}	V_{GE}=±30V,V_{CE}=0V	--	--	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	V_{CE}=V_{GE},I_C=1mA	5	6	7	V
Collector-emitter saturation voltage	V_{CEsat}	V_{GE}=15V,I_C=50A,T_j=25℃	--	2.0	2.5	V
		V_{GE}=15V,I_C=50A,T_j=175℃	--	2.7	--	V
Transconductance	g_{fs}	V_{CE}=20V,I_C=50A	--	30	--	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{CE}=25V,V_{GE}=0V f=1MHz	--	2528	--	pF
Output Capacitance	C_{oss}		--	115	--	
Reverse Transfer Capacitance	C_{rss}		--	24	--	
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	V_{CE}=400V,I_C=50A, R_g=5Ω,V_{GE}=15V, 感性负载,T_j=25℃	--	25	--	nS
Rise time	t_r		--	72	--	nS
Turn-off delay time	$t_{d(off)}$		--	60	--	nS
Fall time	t_f		--	86	--	nS
Turn-on energy	E_{on}		--	0.95	--	mJ
Turn-off energy	E_{off}		--	0.98	--	mJ
Total switching energy	E_{ts}		--	1.93	--	mJ
Turn-on delay time	$t_{d(on)}$	V_{CE}=400V,I_C=50A, R_g=5Ω,V_{GE}=15V, 感性负载,T_j=175℃	--	25	--	nS
Rise time	t_r		--	69	--	nS
Turn-off delay time	$t_{d(off)}$		--	78	--	nS
Fall time	t_f		--	155	--	nS
Turn-on energy	E_{on}		--	0.98	--	mJ
Turn-off energy	E_{off}		--	1.06	--	mJ
Total switching energy	E_{ts}		--	2.04	--	mJ
Gate charge	Q_g	V_{CE}=520V,I_C=50A, V_{GE}=15V	--	86	--	nC

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Diode Characteristic						
Diode forward voltage	V_F	I_F=20A,T_j=25℃	--	1.7	2.2	V
		I_F=20A,T_j=175℃	--	1.3	--	V
Diode reverse recovery time	t_{rr}	I_F=20A, di/dt=100A/uS	--	124	--	nS
Diode peak reverse recovery current	I_{RRM}		--	1.4	--	A
Diode reverse recovery charge	Q_{rr}		--	98	--	nC

Notes：

1.Pulse duration is limited by $T_{j,max}$

5 Typical Characteristic Curves

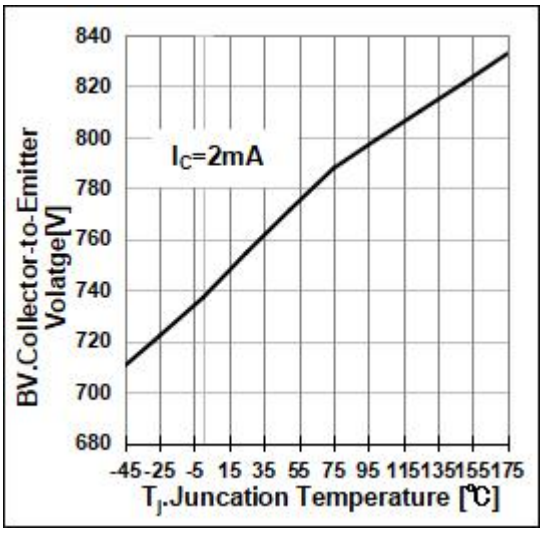


Fig1.**Collector-to-Emitter Breakdown Voltage Temperature characteristic**

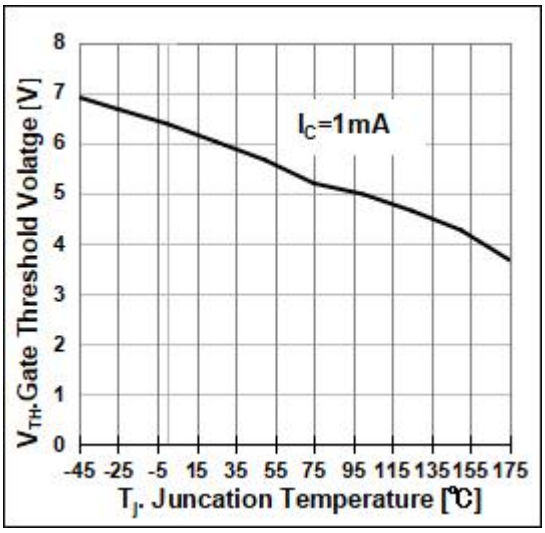


Fig2.**Gate Threshold Voltage Temperature characteristic**

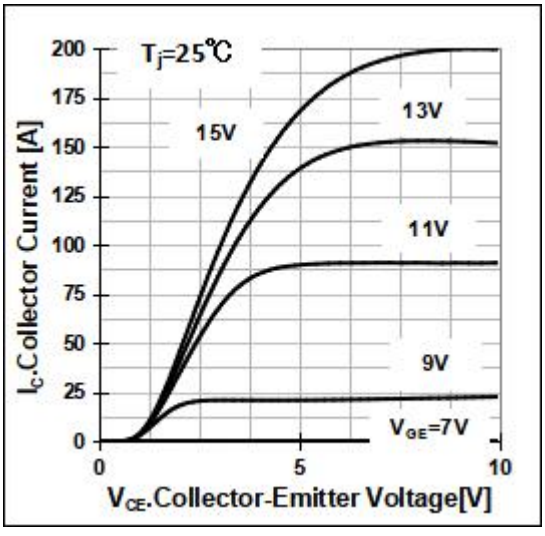


Fig3.**Typical output characteristic**

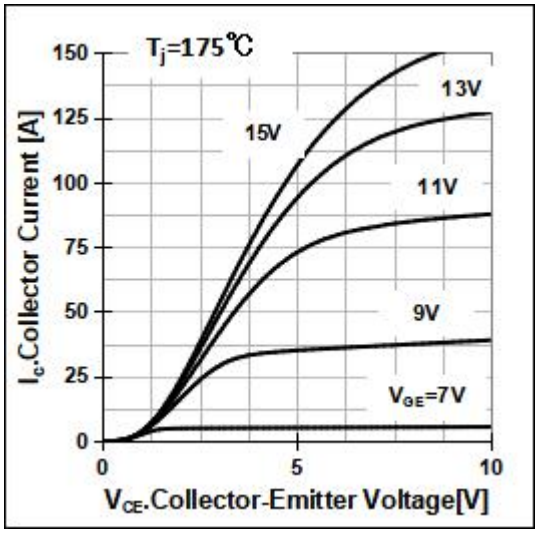


Fig4.**Typical output characteristic**

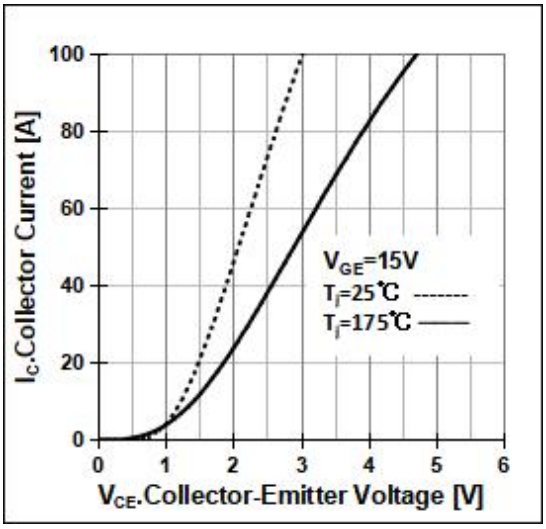


Fig5.**Collector-emitter saturation voltage Characteristic**

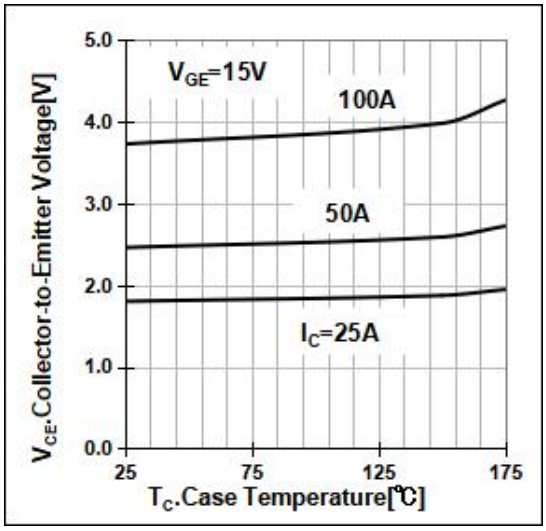


Fig6.**Collector-emitter saturation voltage Temperature Characteristic**

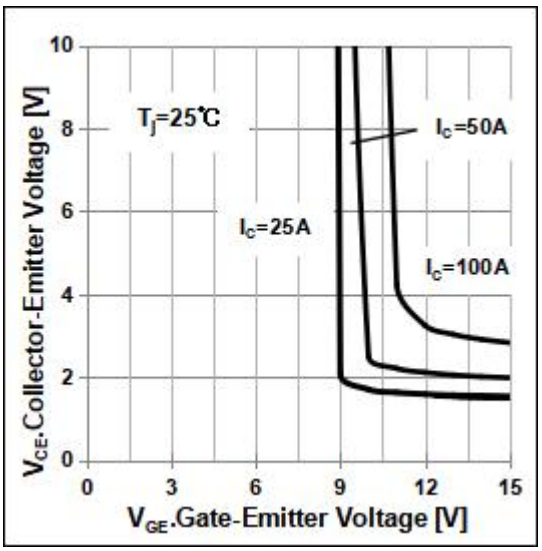


Fig7.**Typical Transfer characteristic curve of Saturation Voltage vs Vge**

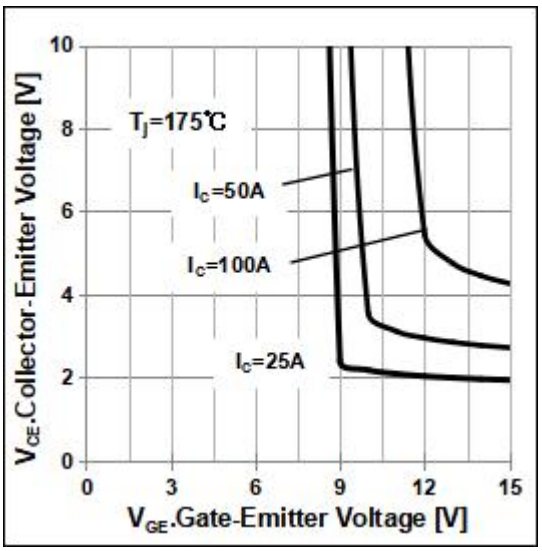


Fig8. **Typical Transfer characteristic curve of Saturation Voltage vs Vge**

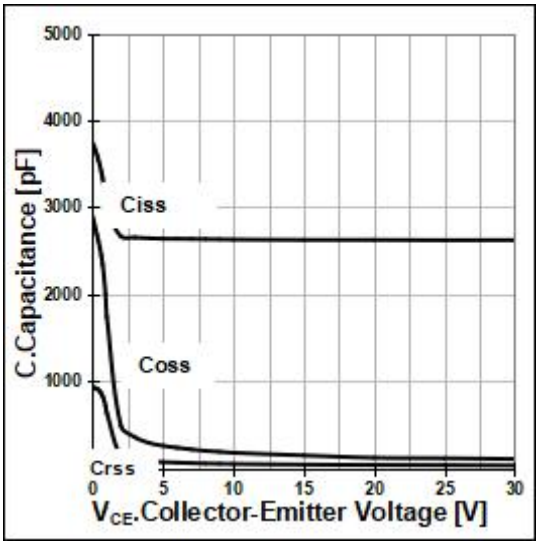


Fig9.**Typical capacitance as a function of collector-emitter voltage**

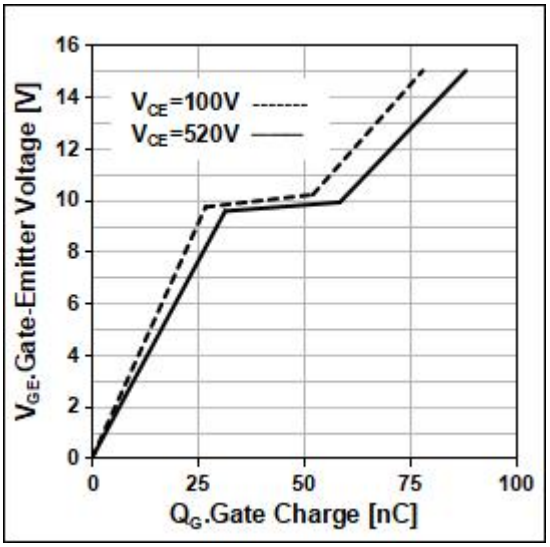


Fig10.**Typical gate charge**

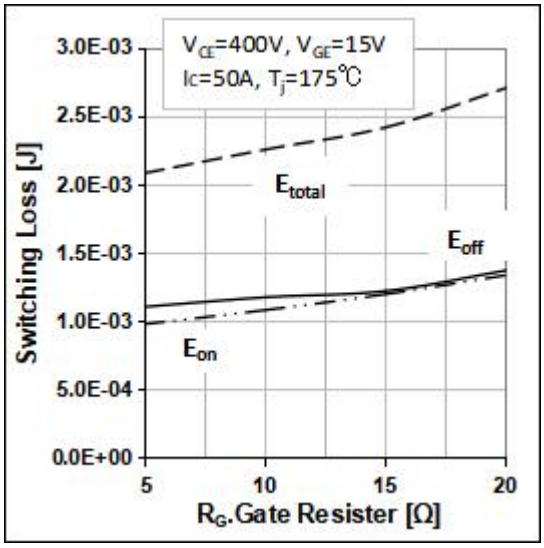


Fig11.**Typical switching energy losses as a function of gate resistor**

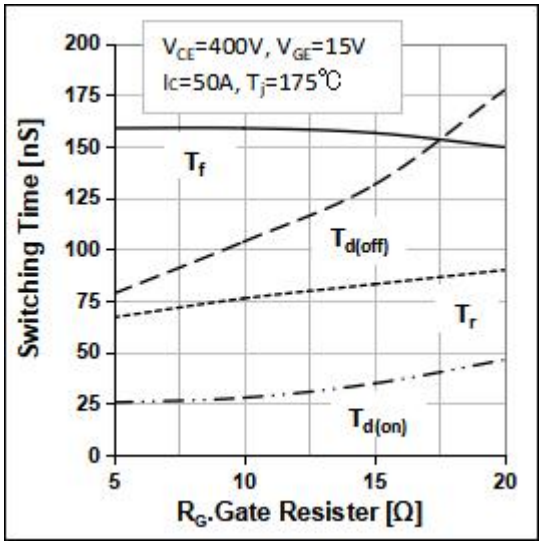


Fig12.**Typical switching times as a function of gate resistor**

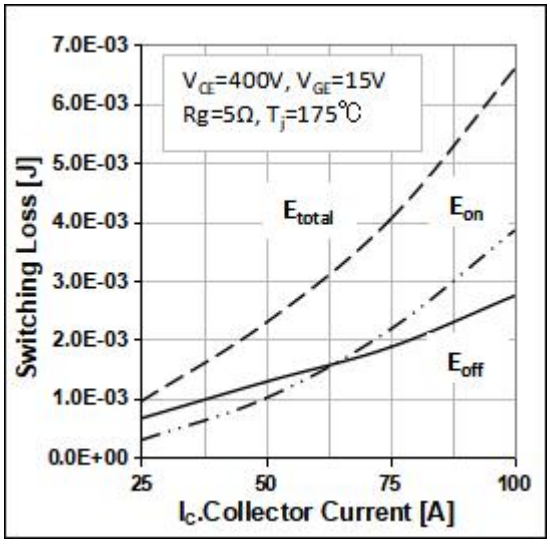


Fig13.**Typical switching energy losses as a function of Collector Current**

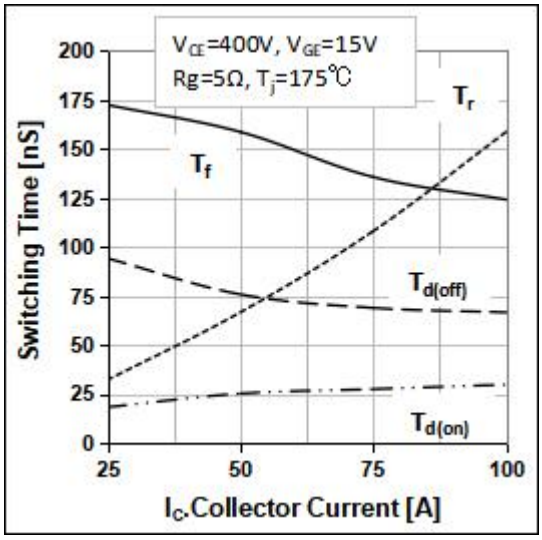


Fig14.**Typical switching times as a function of Collector Current**

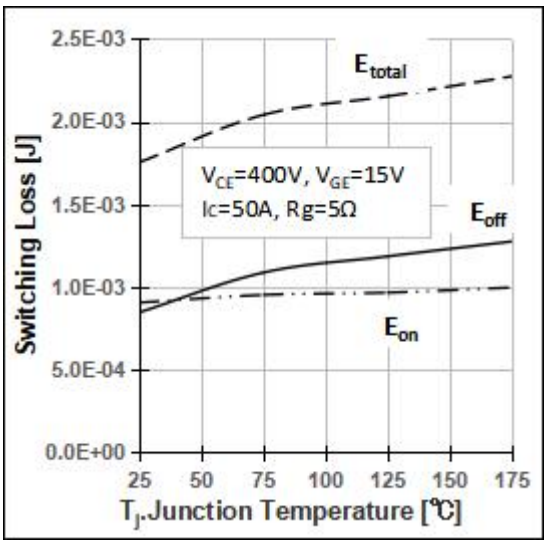


Fig15.**Typical switching energy losses as a function of Junction temperature**

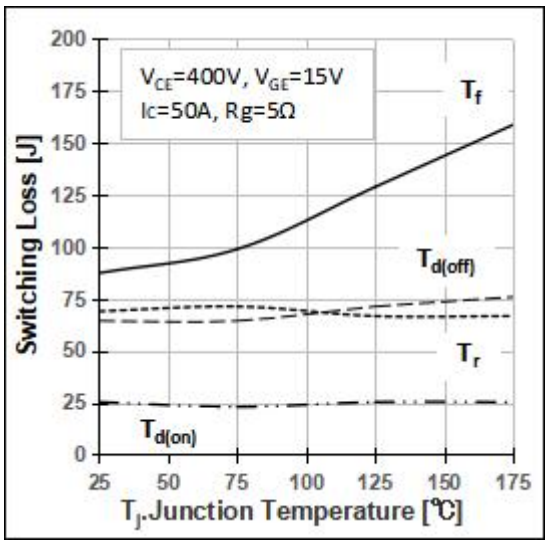


Fig16.**Typical switching times as a function of Junction temperature**

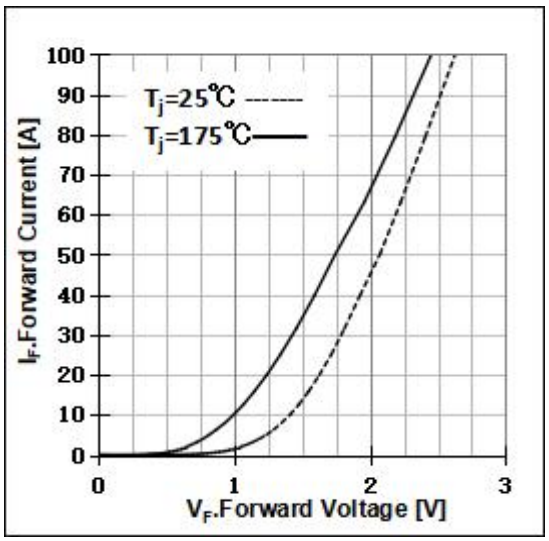


Fig17.**Typical diode forward current as a function of forward voltage**

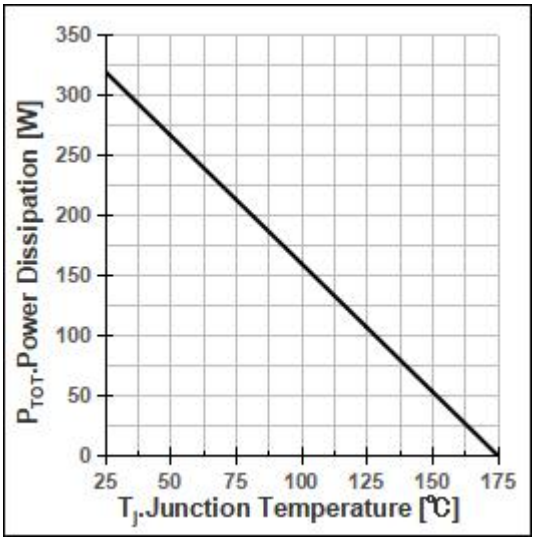


Fig18.**Power dissipation temperature characteristic**

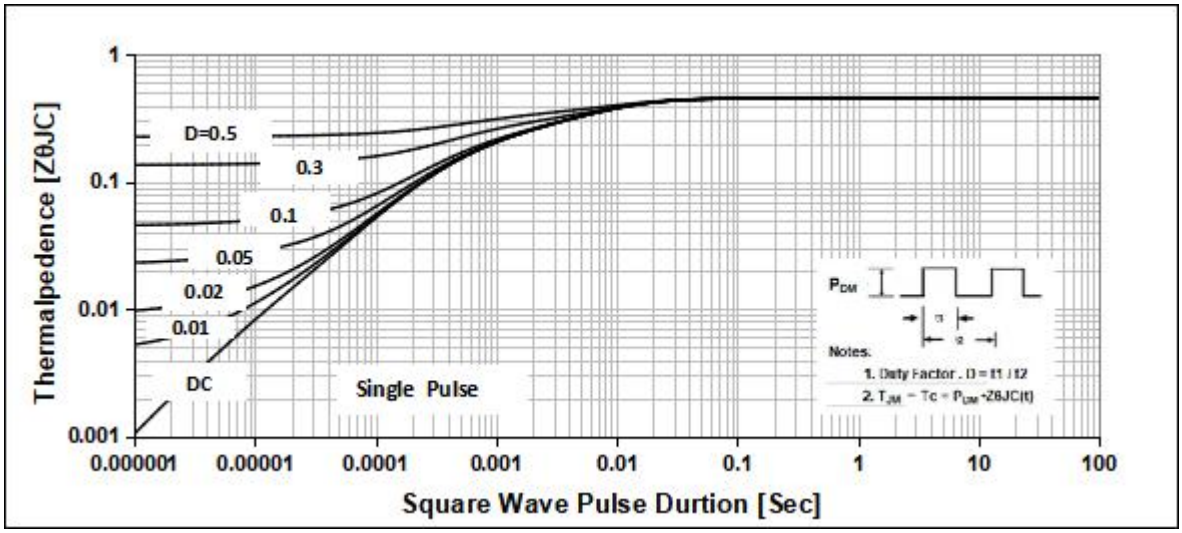
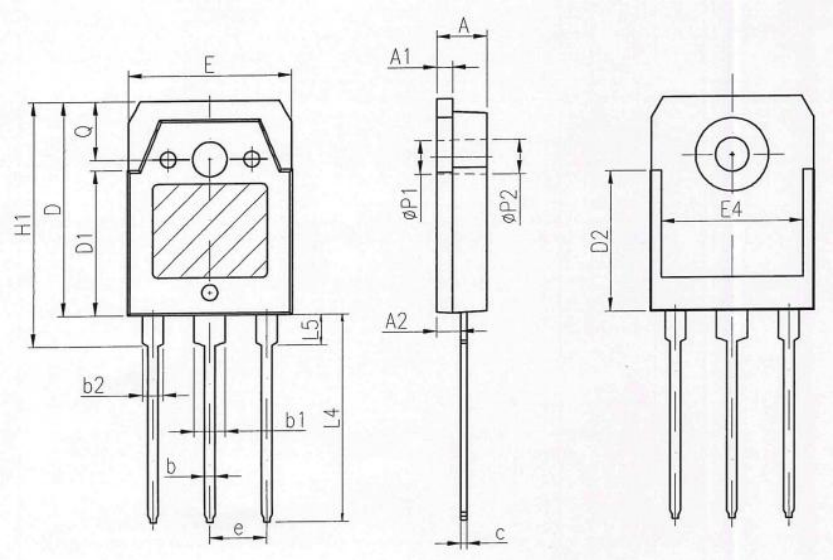


Fig19.**IGBT transient thermal resistance**

6 Dimensions (TO-3PN)



项　目	规范(mm)		项　目	规范(mm)	
	MIN	MAX		MIN	MAX
A	4.6	5	E	15.4	15.8
A1	1.45	1.65	E4	12.6	--
A2	2.2	2.6	e	5.15	5.75
b	0.8	1.2	H1	22.65	23.15
b1	2.8	3.2	L4	19.8	20.2
b2	1.8	2.2	L5	3.3	3.7
c	0.55	0.75	ΦP1	3.20 REF	
D	19.2	19.7	ΦP2	3.50 REF	
D1	13.1	14.7	Q	5.00 REF	
D2	12.40 REF				

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