NCE15G120T

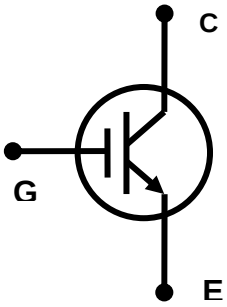
1200V, 15A, Trench NPT IGBT

Features

- Trench NPT(Non Punch Through) IGBT
- High speed switching
- Low saturation voltage: $V_{CE(sat)}$=2.0V@I_C=15A
- High input impedance

Applications

- Inductive heating, Microwave oven, Inverter, UPS, etc.
- Soft switching applications



General Description

Using advanced Trench NPT technology, NCE's 1200V IGBTs offers superior conduction and switching performances, and easy parallel operation with exceptional avalanche ruggedness. This device is designed for soft switching applications.

Absolute Maximum Ratings

Symbol	Description	Ratings	Units
V_{CES}	Collector to Emitter Voltage	1200	V
V_{GES}	Gate to Emitter Voltage	+/-30	V
I_C	Continuous Collector Current @T_C=25°C	30	A
	Continuous Collector Current @T_C=100°C	15	A
I_{CM}(1)	Pulsed Collector Current	45	A
P_D	Maximum Power Dissipation @T_C=25°C	220	W
	Maximum Power Dissipation @T_C=100°C	88	W
T_J	Operating Junction Temperature	-55 to +150	°C
T_{stg}	Storage Temperature Range	-55 to +150	°C
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5seconds	300	°C

Notes:

1. Repetitive rating, Pulse width limited by max. junction temperature

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	0.57	°C/W
R_{JA}	Thermal Resistance, Junction to Ambient	-	40	°C/W

Electrical Characteristics of the IGBT T_C=25°C

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE}=0V, Ic=1mA	1200	-	-	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES}, V_{GE}=0V	-	-	1	mA
I_{GES}	G-E Leakage Current	V_{GE}=V_{GES}, V_{CE}=0V	-	-	+/-250	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	I_C=15mA, V_{CE}=V_{GE}	4.0	5.5	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=15A, V_{GE}=15V T_C=25°C	-	2	2.5	V
		I_C=15A, V_{GE}=15V T_C=125°C	-	2.15	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE}=30V, V_{GE}=0V, f=1MHz	-	2350	-	pF
C_{oes}	Output Capacitance		-	70	-	pF
C_{res}	Reverse Transfer Capacitance		-	45	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=15A, R_G=10Ω,V_{GE}=15V, Resistive Load, T_C=25°C	-	33	-	ns
t_r	Rise Time		-	80	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	160	-	ns
t_f	Fall Time		-	255	330	ns
E_{on}	Turn-On Switching Loss		-	0.3	-	mJ
E_{off}	Turn-Off Switching Loss		-	0.58	0.74	mJ
E_{ts}	Total Switching Loss		-	0.88	-	mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=15A, R_G=10Ω,V_{GE}=15V, Resistive Load, T_C=125°C	-	30	-	ns
t_r	Rise Time		-	115	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	170	-	ns
t_f	Fall Time		-	390	-	ns
E_{on}	Turn-On Switching Loss		-	0.38	-	mJ
E_{off}	Turn-Off Switching Loss		-	0.89	-	mJ
E_{ts}	Total Switching Loss		-	1.27	-	mJ
Q_g	Total Gate Charge	V_{CC}=600V,I_C=15A, V_{GE}=15V	-	100	-	nC
Q_{ge}	Gate to Emitter Charge		-	19	-	nC
Q_{gc}	Gate to Collector Charge		-	45	-	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

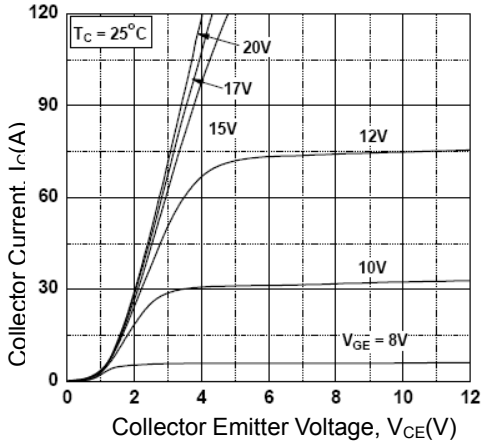


Figure 2. Typical Saturation Voltage Characteristics

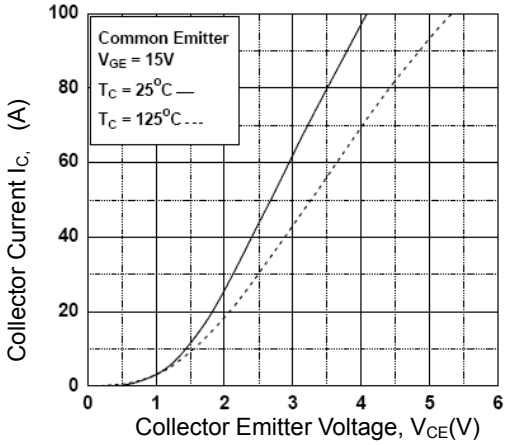


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

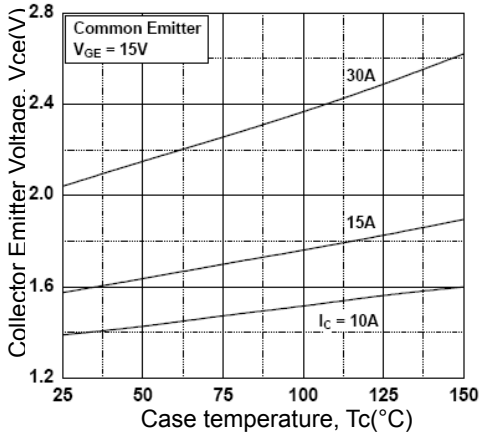


Figure 4. Saturation Voltage vs. V_{GE}

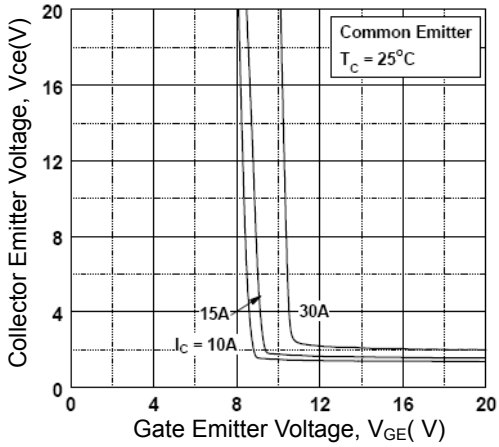


Figure 5. Saturation Voltage vs. V_{GE}

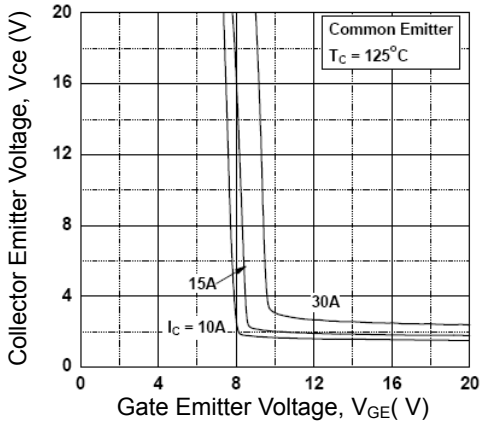
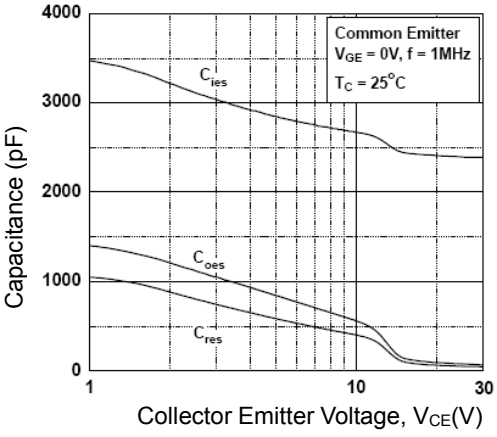


Figure 6. Capacitance Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Turn-on Characteristics vs. Gate Resistance

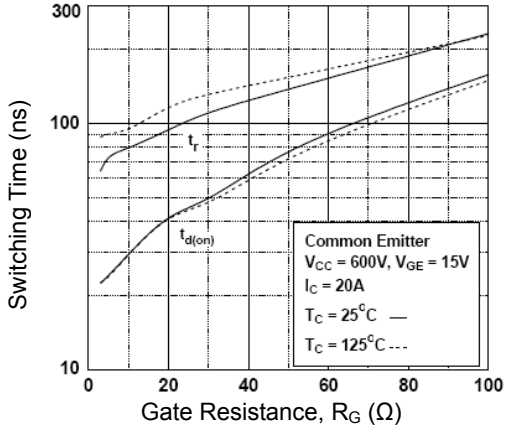


Figure 8. Turn-off Characteristics vs. Gate Resistance

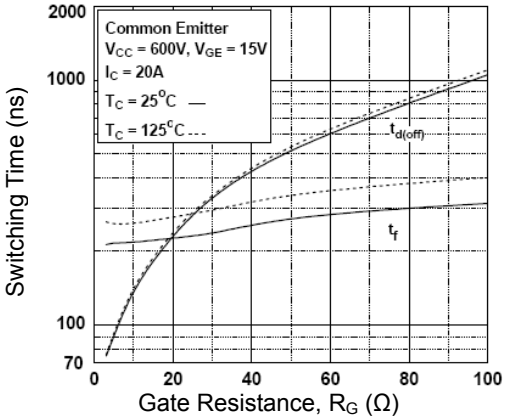


Figure 9. Switching Loss vs. Gate Resistance

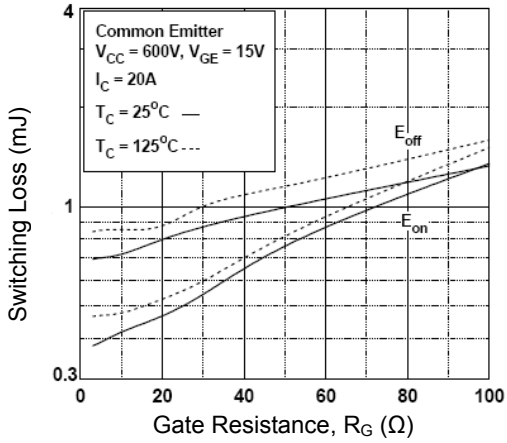


Figure 10. Turn-on Characteristics vs. Collector Current

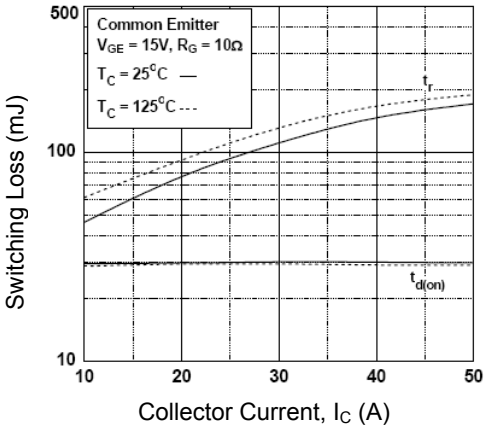


Figure 11. Turn-Off Characteristics vs. Collector Current

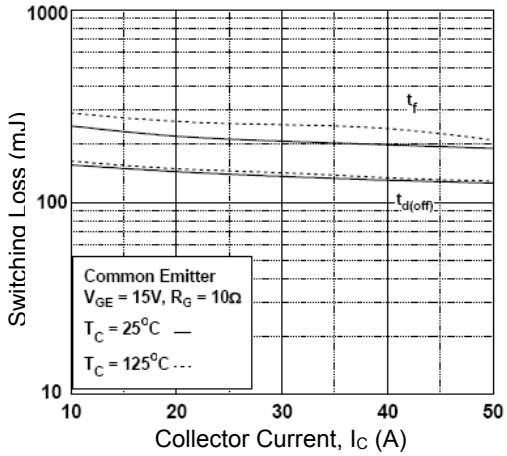
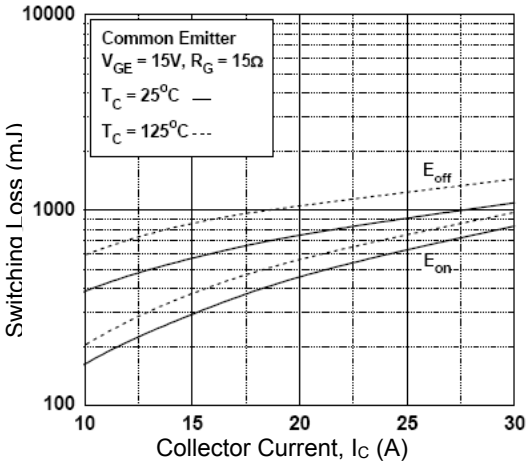


Figure 12. Switching Loss vs. Collector Current



Typical Performance Characteristics (Continued)

Figure13. Gate Charge Characteristics

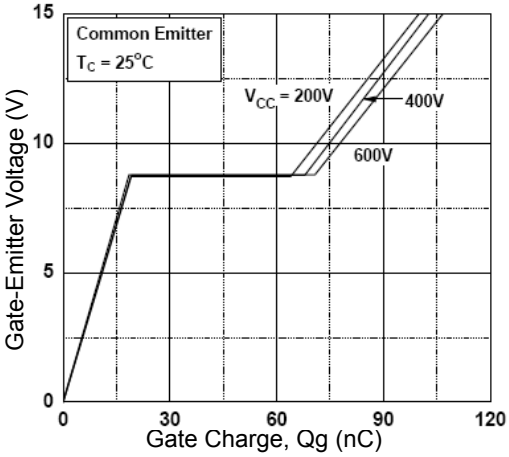


Figure 14. SOA Characteristics

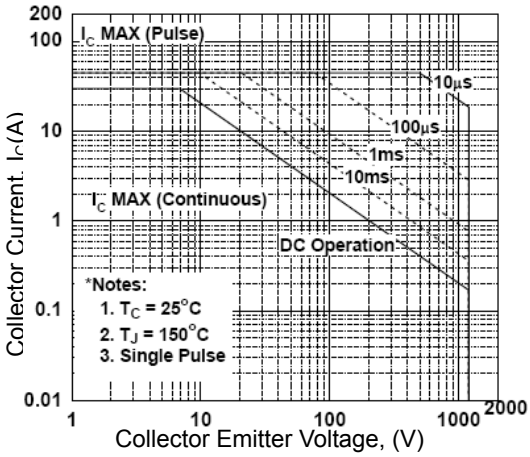


Figure 15. Turn-Off SOA

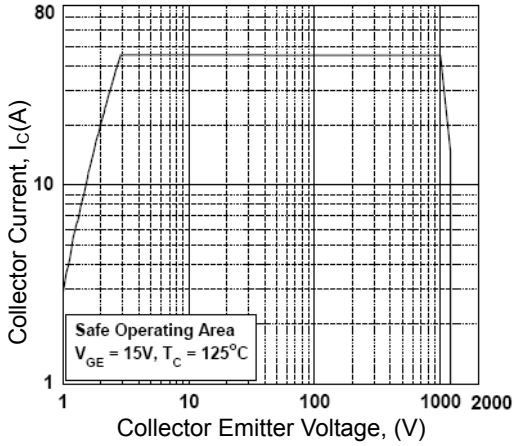
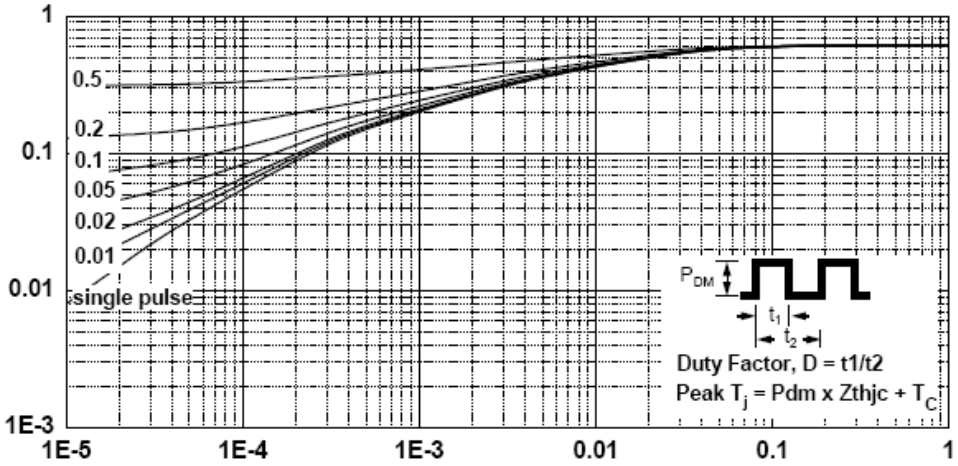
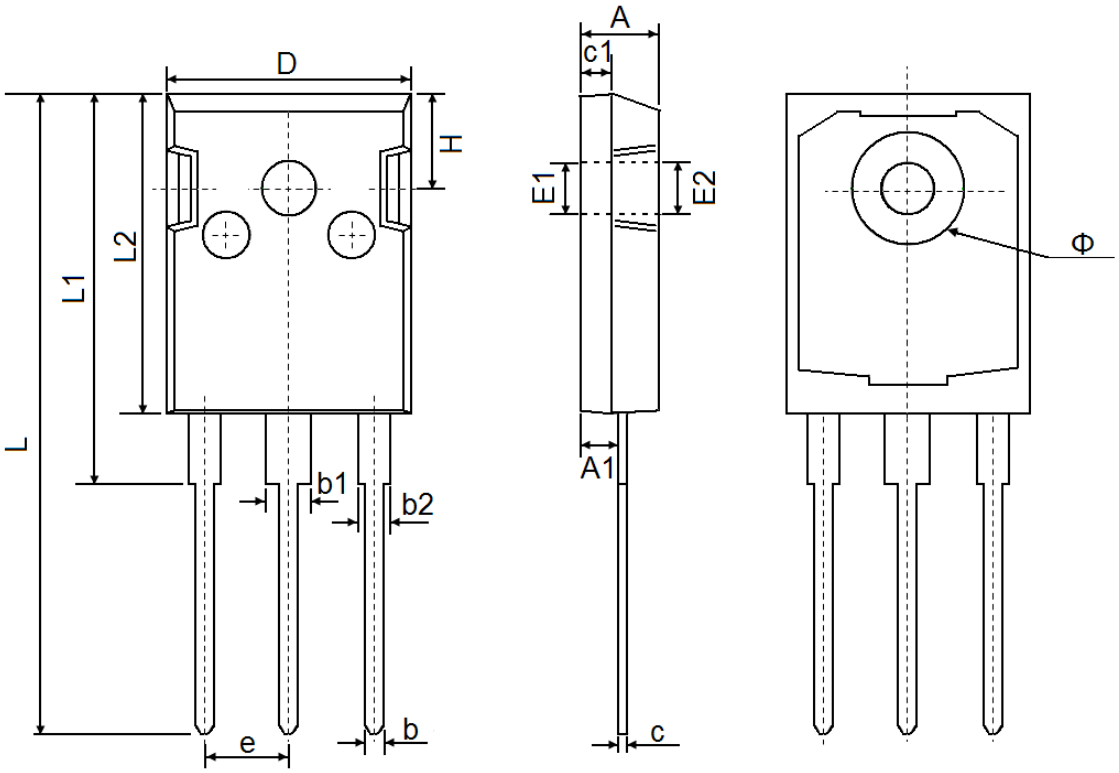


Figure 16. Transient Thermal Impedance of IGBT



TO-247 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	

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