

NCE20ED135T

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1350V, 20A, Trench FS IGBT

Features

- Trench FS(Field Stop) IGBT
- High speed switching
- Low saturation voltage: $V_{CE(sat)}=2.0V@I_C=20A$
- High input impedance

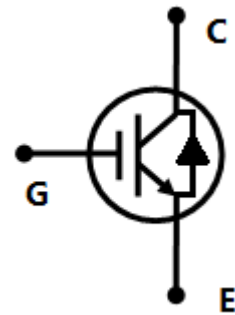


Applications

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

General Description

Using advanced Trench field stop technology, NCE's 1350V 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	1350	V
V_{GES}	Gate to Emitter Voltage	+/-30	V
I_C	Continuous Collector Current @ $T_C=25^{\circ}C$	40	A
	Continuous Collector Current @ $T_C=100^{\circ}C$	20	A
$I_{CM}(1)$	Pulsed Collector Current	60	A
I_F	Diode Continuous Forward Current @ $T_C=100^{\circ}C$	20	
I_{FM}	Diode Maximum Forward Current	60	A
P_D	Maximum Power Dissipation @ $T_C=25^{\circ}C$	340	W
	Maximum Power Dissipation @ $T_C=100^{\circ}C$	170	W
T_J	Operating Junction Temperature	-55 to +150	$^{\circ}C$
T_{stg}	Storage Temperature Range	-55 to +150	$^{\circ}C$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5seconds	260	$^{\circ}C$

Notes:

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\square JC}$	Thermal Resistance, Junction to Case	-	0.37	$^{\circ}C/W$
R_{JA}	Thermal Resistance, Junction to Ambient	-	40	$^{\circ}C/W$

Electrical Characteristics $T_C=25^{\circ}C$

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV _{CES}	Collector to Emitter Breakdown Voltage	V _{GE} =0V, I _C =1mA	1350	-	-	V
I _{CES}	Collector Cut-Off Current	V _{CE} =1350V, V _{GE} =0V	-	-	100	uA
I _{GES}	G-E Leakage Current	V _{GE} =30V, V _{CE} =0V	-	-	+/-100	nA
On Characteristics						
V _{GE(th)}	G-E Threshold Voltage	I _C =1mA, V _{CE} =V _{GE}	5		7	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C =20A, V _{GE} =15V T _C =25°C	-	1.7	2	V
		I _C =20A, V _{GE} =15V T _C =125°C	-	2	-	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V, f=1MHz	-	2050	-	pF
C _{oes}	Output Capacitance		-	70	-	pF
C _{res}	Reverse Transfer Capacitance		-	40	-	pF
Switching Characteristics						
t _{d(off)}	Turn-Off Delay Time	V _{CC} =600V,I _C =20A, R _G =10Ω,V _{GE} =15V, Inductive Load, T _C =25°C	-	190	-	ns
t _f	Fall Time		-	100		ns
E _{off}	Turn-Off Switching Loss		-	0.9		mJ
t _{d(off)}	Turn-Off Delay Time	V _{CC} =600V,I _C =20A, R _G =10Ω,V _{GE} =15V, Inductive Load, T _C =125°C	-	200		ns
t _f	Fall Time		-	154		ns
E _{off}	Turn-Off Switching Loss		-	1.4		mJ
Q _g	Total Gate Charge	V _{CC} =600V,I _C =20A, V _{GE} =15V	-	190	240	nC
Q _{ge}	Gate to Emitter Charge		-	15	23	nC
Q _{gc}	Gate to Collector Charge		-	80	120	nC
Diode Characteristics						
V _{FM}	Forward Voltage	I _F =20A,T _C =25°C	-	1.8	2	V
t _{rr}	Reverse Recovery Time	I _F =20A, dI/dt=200A/us T _C =25°C	-	235	350	ns
I _{rr}	Peak Reverse Recovery Current		-	27	40	A
Q _{rr}	Reverse Recovery Charge		-	3130	4700	uC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

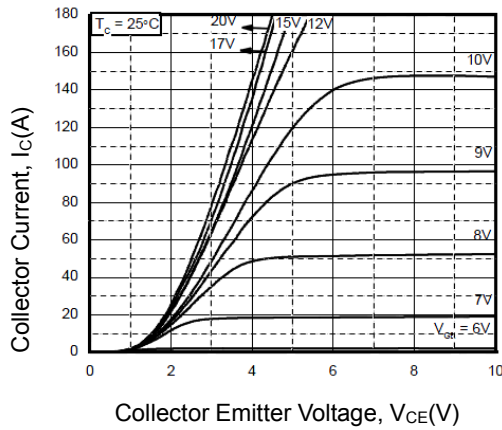


Figure 2. Typical Saturation Voltage Characteristics

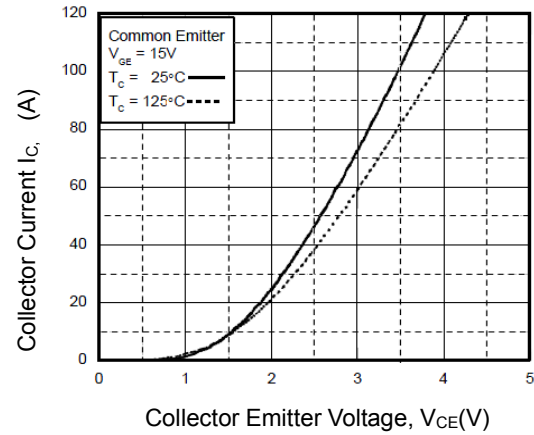


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

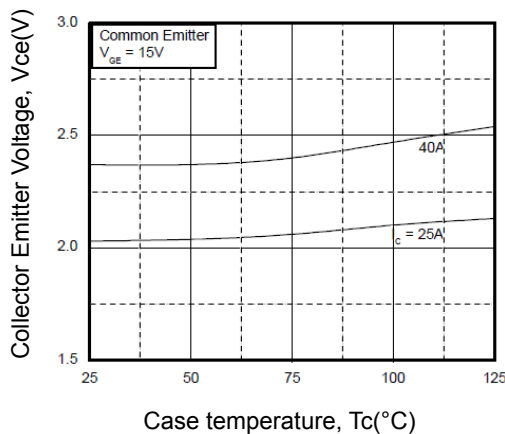


Figure 4. Saturation Voltage vs. V_{GE}

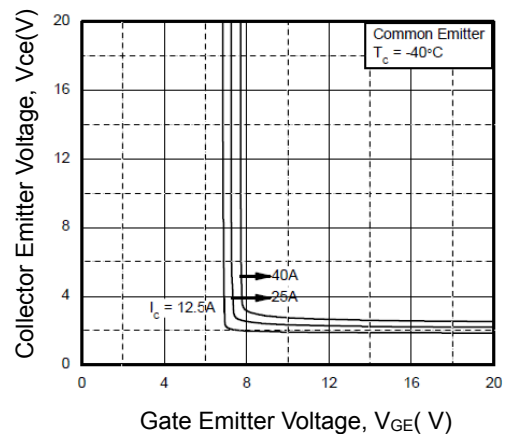


Figure 5. Saturation Voltage vs. V_{GE}

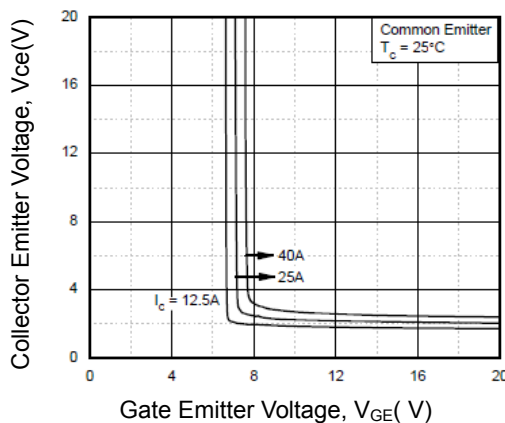
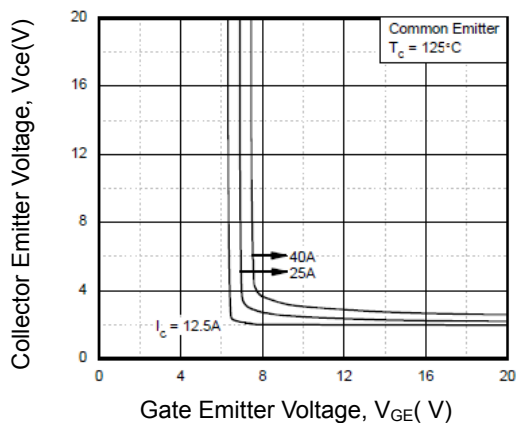


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics (Continued)

Figure 7. Capacitance Characteristics

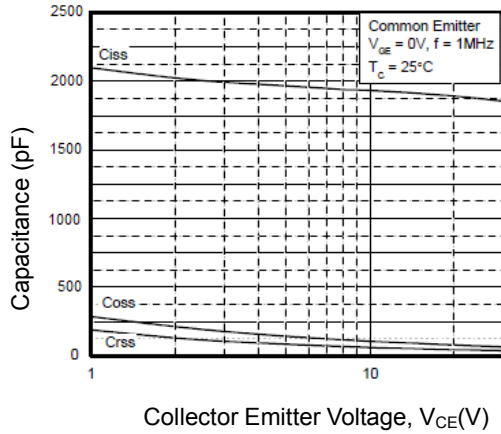


Figure 8. Turn-on Characteristics vs. Gate Resistance

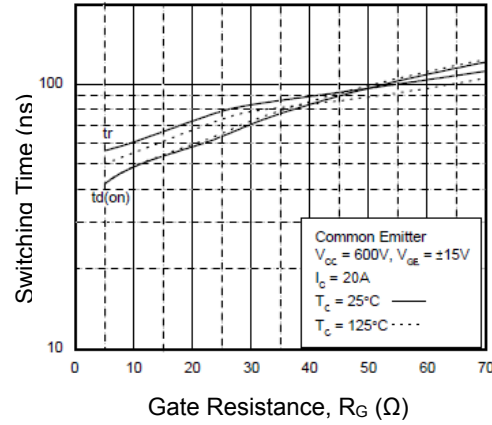


Figure 9. Turn-off Characteristics vs. Gate Resistance

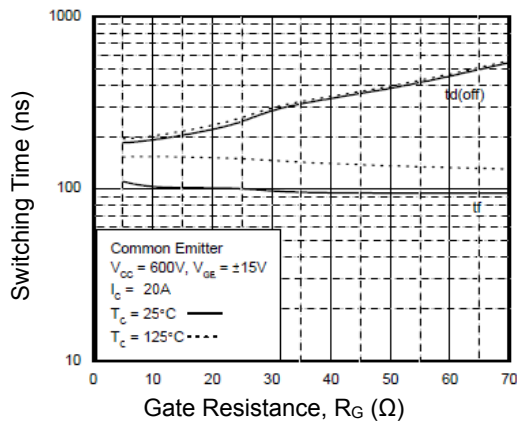


Figure 10. Switching Loss vs. Gate Resistance

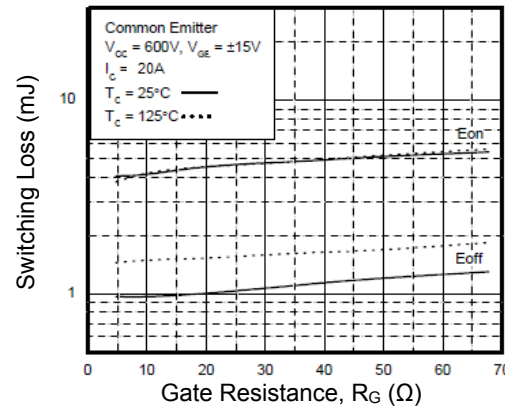


Figure 11. Turn-on Characteristics vs. Collector Current

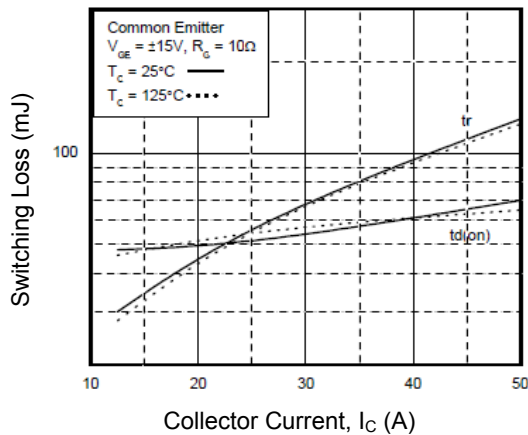
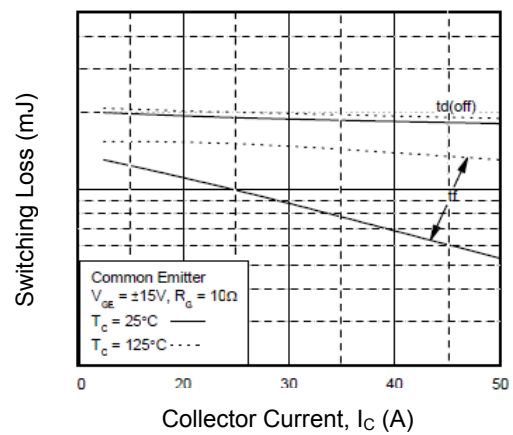


Figure 12. Turn-Off Characteristics vs. Collector Current



Typical Performance Characteristics (Continued)

Figure 13. Switching Loss vs. Collector Current

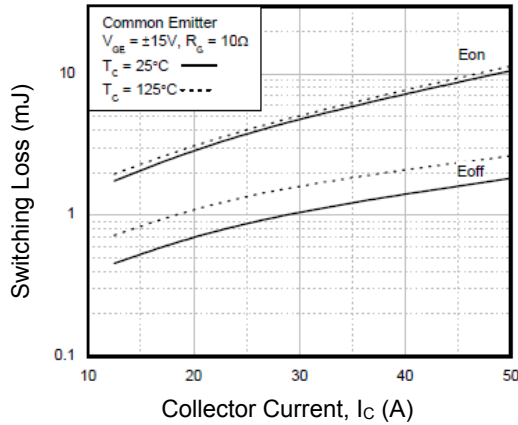


Figure14. Gate Charge Characteristics

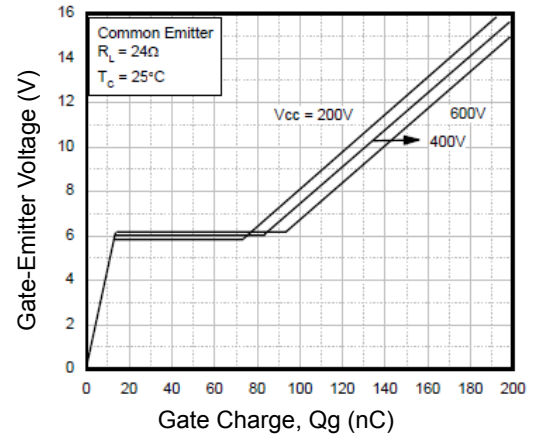


Figure 15. SOA Characteristics

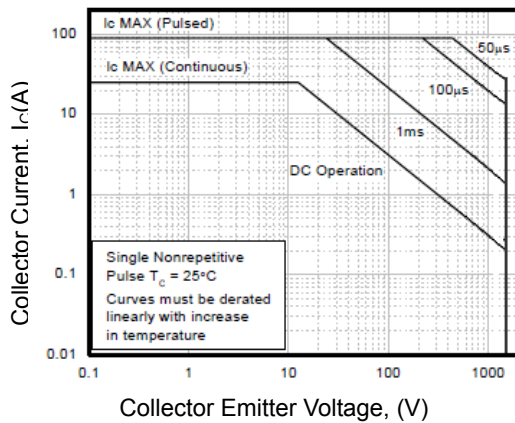


Figure 16. Turn-Off SOA

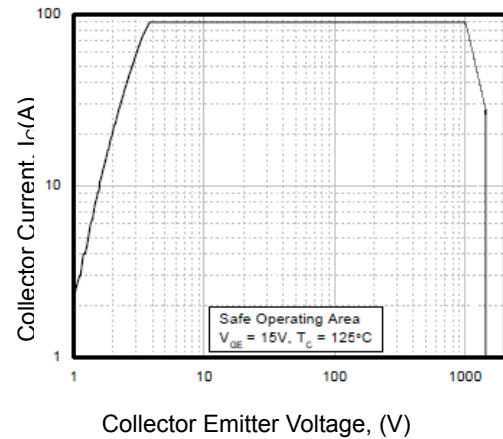
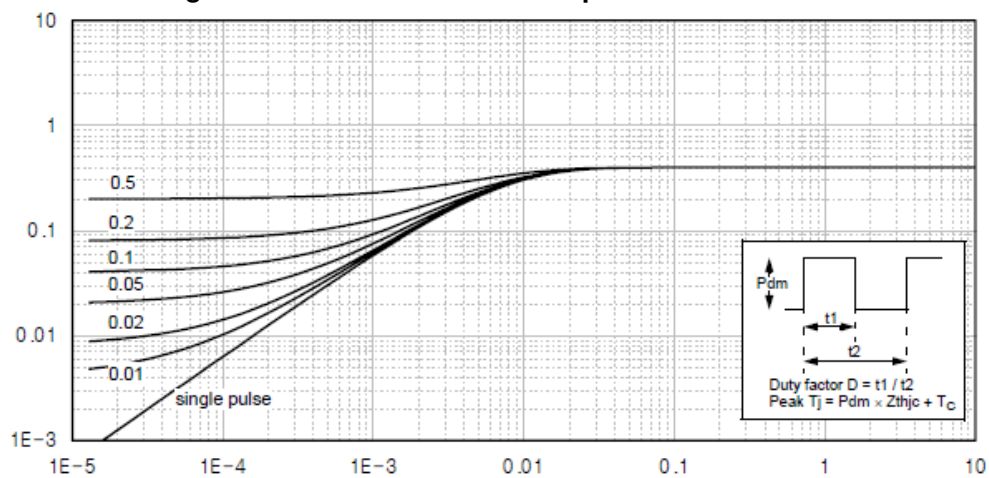
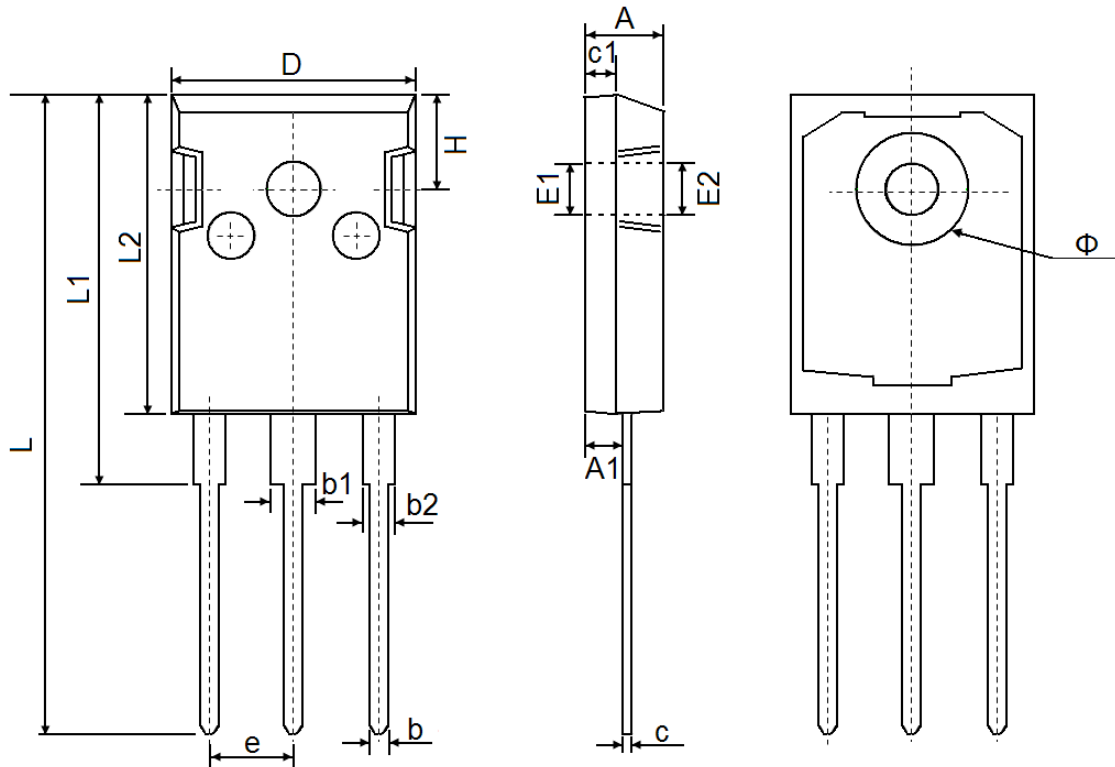


Figure 17. Transient Thermal Impedance of IGBT



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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