

1350V, 25A, Trench FS II Fast IGBT

General Description:

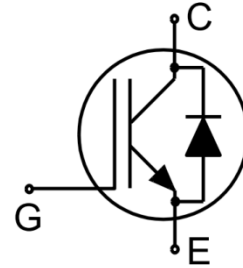
Using NCE's proprietary trench design and advanced FS (Field Stop) second generation technology, the 1350V Trench FSII IGBT offers superior conduction and switching performances, and easy parallel operation;

Features

- Trench FSII Technology offering
- Very low $V_{CE(sat)}$
- Positive temperature coefficient in $V_{CE(sat)}$
- Very tight parameter distribution
- High ruggedness, temperature stable behavior

Application

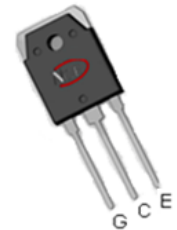
- Inductive Cooking
- Soft Switching Applications



Schematic diagram

Package Marking and Ordering Information

Device	Device Package	Device Marking
NCE25TD135LP	TO-3PN	NCE25TD135LP



TO-3PN

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	1350	V
V_{GES}	Gate- Emitter Voltage	± 30	V
I_C	Collector Current	50	A
	Collector Current @ $T_C = 100^\circ\text{C}$	25	A
I_{Cpuls}	Pulsed Collector Current, t_p limited by T_{jmax}	75	A
-	turn off safe operating area, $V_{CE}=1200\text{V}$, $T_j=150^\circ\text{C}$	75	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	25	A
I_{FM}	Diode Maximum Forward Current	75	A
P_D	Power Dissipation @ $T_C = 25^\circ\text{C}$	365	W
	Power Dissipation @ $T_C = 100^\circ\text{C}$	183	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	260	$^\circ\text{C}$

Thermal Characteristic

Symbol	Parameter	Value	Units
R _{θJC}	Thermal Resistance, Junction to case for IGBT	0.41	°C/W
R _{θJC}	Thermal Resistance, Junction to case for Diode	0.86	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	40	°C/W

Electrical Characteristics (T_c=25°C unless otherwise noted)

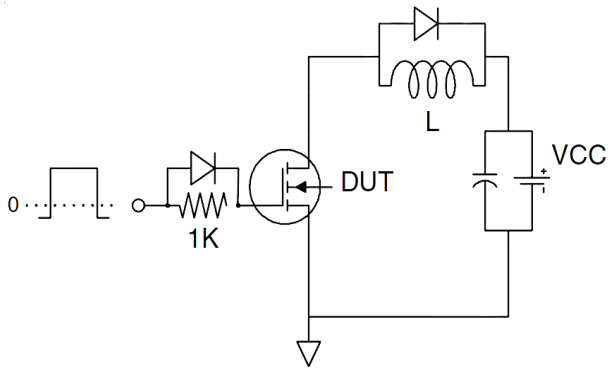
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
Static Characteristics						
V _{(BR)CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V, I _{CE} =1mA	1350	--	--	V
I _{CES}	Collector-Emitter Leakage Current	V _{GE} =0V, V _{CE} =1350V	--	--	5	μA
I _{GES(F)}	Gate to Emitter Forward Leakage	V _{GE} =+30V, V _{CE} =0V	--	--	200	nA
I _{GES(R)}	Gate to Source Reverse Leakage	V _{GE} =-30V, V _{CE} =0V	--	--	200	nA
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C =20A, T _J =25°C	--	1.6	--	V
		V _{GE} =15V, I _C =25A, T _J =25°C	--	1.7	1.9	
		V _{GE} =15V, I _C =30A, T _J =25°C	--	1.8	--	V
		V _{GE} =15V, I _C =25A, T _J =150°C	--	1.9	--	
V _{GE(th)}	Gate Threshold Voltage	I _C =1mA, V _{CE} =V _{GE}	5.0	--	6.5	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V, f=1MHz	--	2674	--	pF
C _{oes}	Output Capacitance		--	72	--	
C _{res}	Reverse Transfer Capacitance		--	59	--	
Q _g	Total Gate Charge	V _{CC} =960V, I _C =25A V _{GE} =15V	--	146	--	nC
Q _{ge}	Gate to Emitter Charge		--	28	--	nC
Q _{gc}	Gate to Collector Charge		--	84	--	nC
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time	V _{CE} =600V, I _C =25A V _{GE} =0/15V, R _g =5Ω Inductive Load	--	19	--	ns
t _r	Rise Time		--	17	--	
t _{d(OFF)}	Turn-Off Delay Time		--	170	--	
t _f	Fall Time		--	18	--	
E _{on}	Turn-On Switching Loss		--	2.0	--	mJ
E _{off}	Turn-Off Switching Loss		--	1.5	--	
E _{ts}	Total Switching Loss		--	3.5	--	

Electrical Characteristics of the Diode (T_c= 25°C unless otherwise specified):

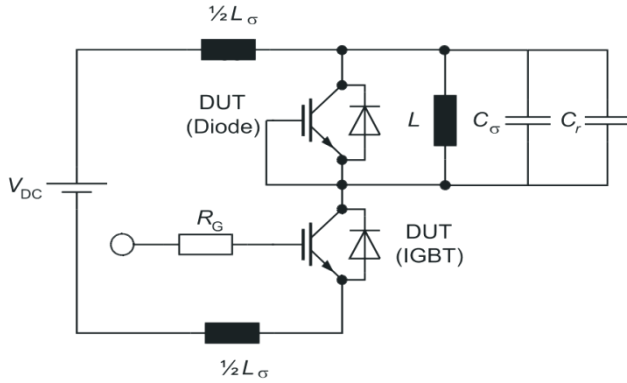
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V _{FM}	Diode Forward Voltage	I _F =12.5A	--	2.4	3.2	V
T _{rr}	Reverse Recovery Time	I _F =12.5A, di/dt=200A/us	--	120	--	ns
I _{RRM}	Diode Peak Reverse Recovery Current		--	12	--	A
Q _{rr}	Reverse Recovery Charge		--	0.72	--	μC
Pulse width t _{tp} ≤380μs, δ≤2%						

Test Circuit

1) Gate Charge Test Circuit

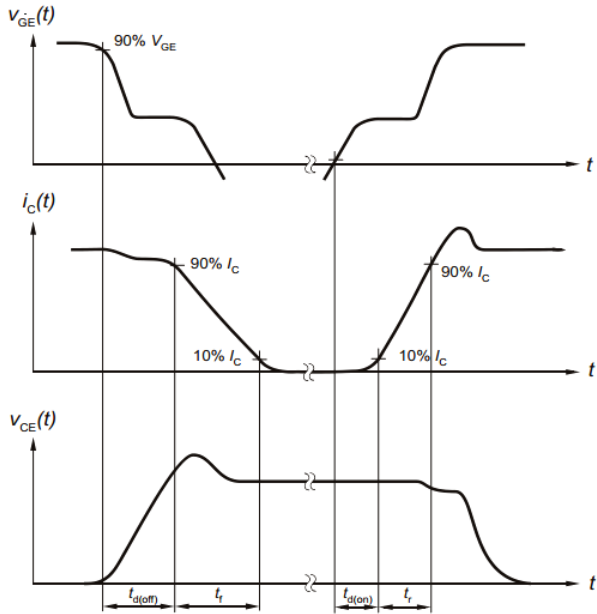


2) Switch Time Test Circuit

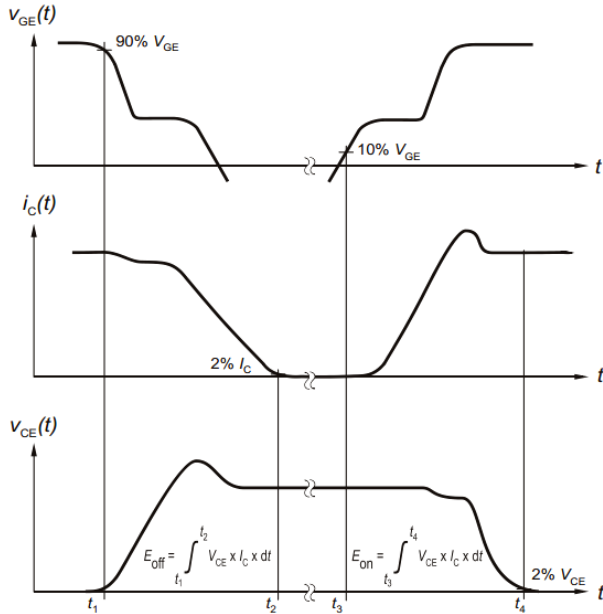


Switching characteristics

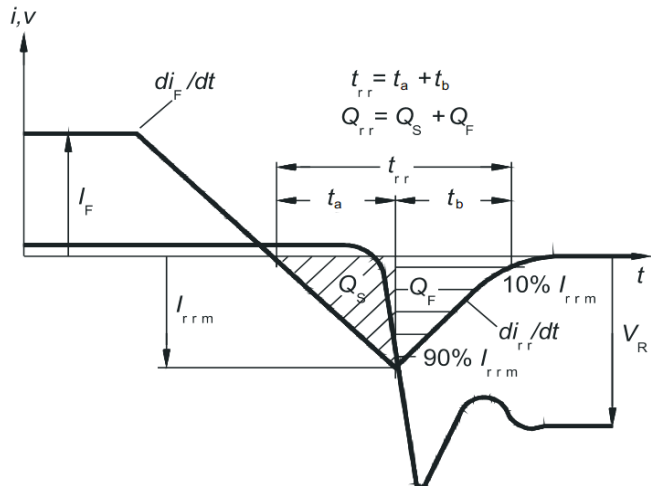
1) Definition of switching times



2) Definition of switching losses



3) Definition of diode switching characteristics



Typical Electrical and Thermal Characteristics

Figure 1 Output Characteristics

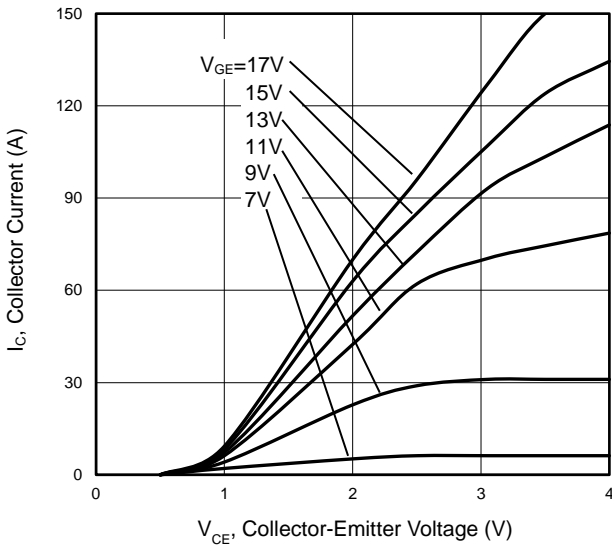


Figure 2 Transfer Characteristics

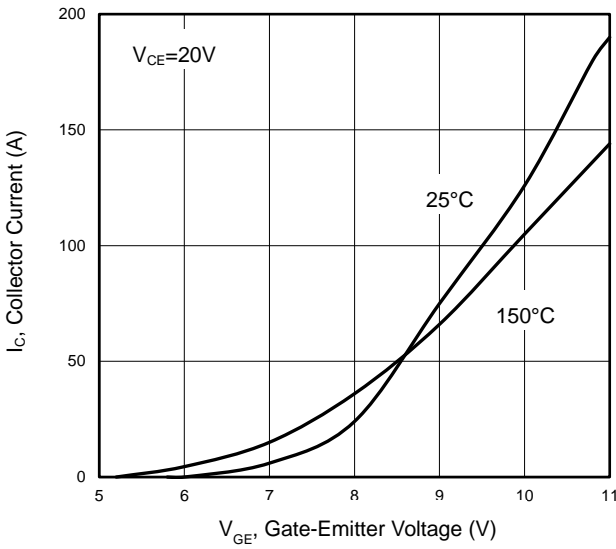


Figure 3 $V_{CE(sat)}$ vs. Case Temperature

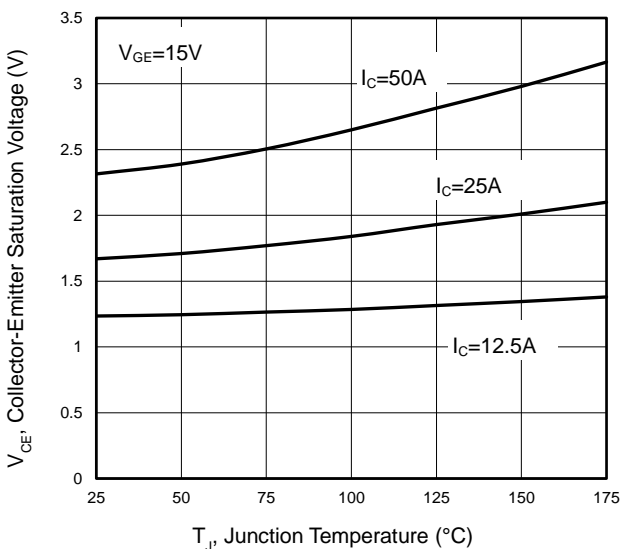


Figure 4 Saturation Voltage vs. V_{GE}

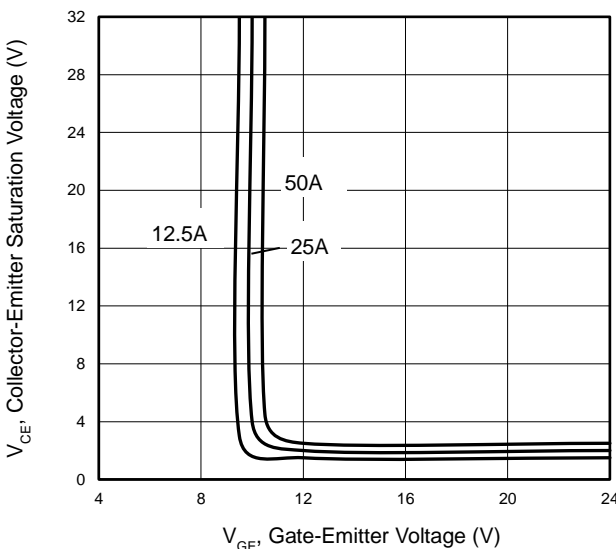


Figure 5 Capacitance Characteristics

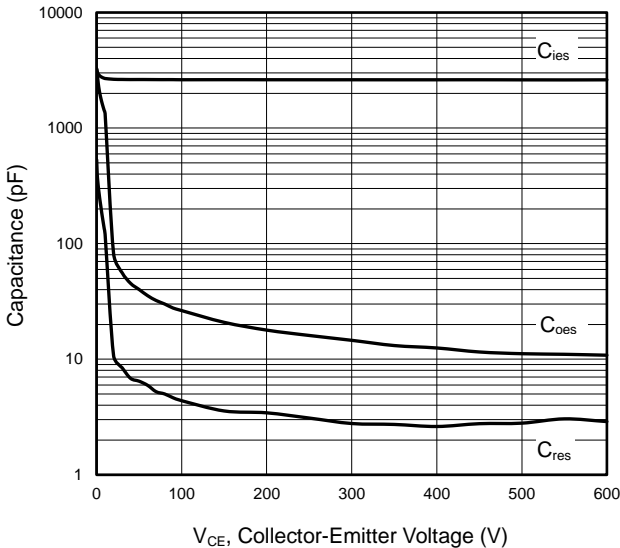
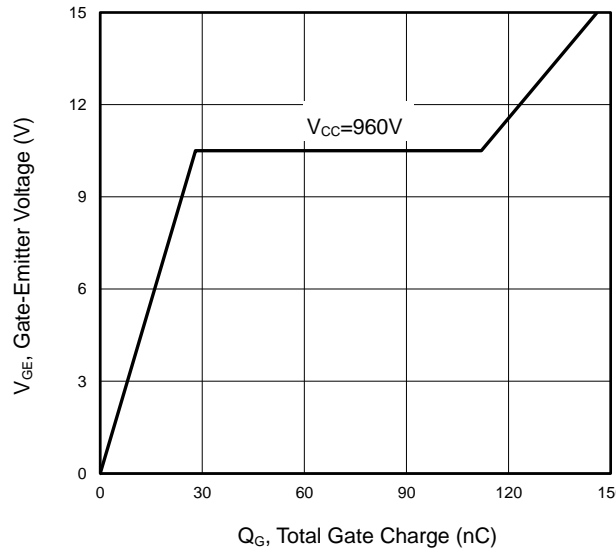
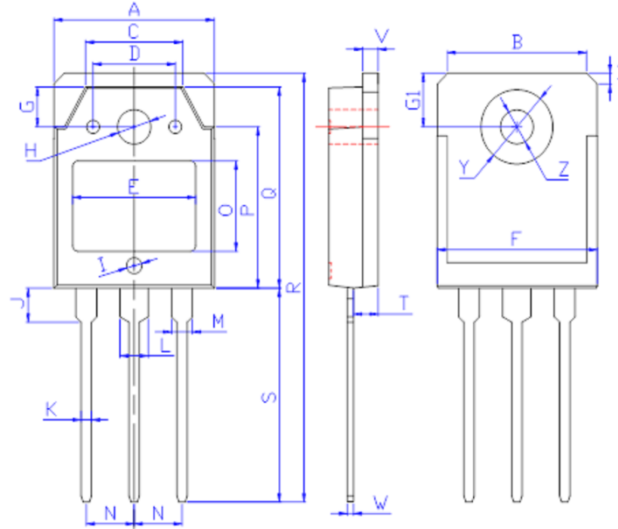


Figure 6 Gate Charge Wave Form



TO-3PN Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	15.30	15.90	0.60	0.63
B	13.30	13.90	0.52	0.55
C	9.20	9.80	0.36	0.39
D	7.70	8.30	0.30	0.33
E	11.55	12.15	0.45	0.48
F	15.35	15.95	0.60	0.63
G	3.50	4.10	0.14	0.16
G1	4.70	5.30	0.19	0.21
H	3.20	3.80	0.13	0.15
I	1.20	1.80	0.05	0.07
J	2.90	3.50	0.11	0.14
K	0.85	1.15	0.03	0.05
L	2.95	3.25	0.12	0.13
M	1.95	2.25	0.08	0.09
N	5.15	5.75	0.20	0.23
O	8.10	8.70	0.32	0.34
P	13.60	14.20	0.54	0.56
Q	18.40	19.00	0.72	0.75
R	39.40	40.60	1.55	1.60
S	19.60	20.40	0.77	0.80
T	2.10	2.70	0.08	0.11
V	1.35	1.65	0.05	0.06
W	0.45	0.75	0.02	0.03
X	1.40	2.20	0.06	0.09
Y	6.70	7.30	0.26	0.29
Z	2.90	3.50	0.11	0.14

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