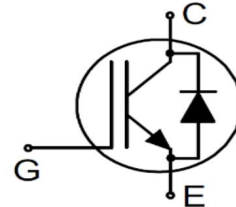




Features

- 650V, 15A IGBT
- Easy paralleling capability due to positive temperature coefficient in $V_{CE(SAT)}$
- Low EMI
- Low Gate Charge
- Low Saturation Voltage $V_{CE(SAT)}$



Application

- UPS
- EV-Charging
- Three-Phase Solar String Inverter
- Energy Storage



Key Performance and Package Parameters

Device	V_{CE}	I_C ($T_C = 25^\circ\text{C}$)	$V_{CE(SAT)}$ ($T_{VJ} = 25^\circ\text{C}$, $V_{GE} = 15\text{V}$)	T_{vjmax}	Package	Packing
IXYP15N65C3D1M	650V	15A	1.79V	175	TO-220F	50PCS

Absolute Maximum Ratings (@ $T_{VJ} = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter		Value	Units
V_{CE}	Collector emitter voltage		650	V
I_C	DC collector current ⁽¹⁾	$T_C = 25^\circ\text{C}$	30	A
		$T_C = 100^\circ\text{C}$	15	A
I_{CM}	Pulsed collector current ⁽¹⁾	$T_C = 25^\circ\text{C}$	60	A
I_F	Maximum Diode forward current	$T_C = 25^\circ\text{C}$	30	A
		$T_C = 100^\circ\text{C}$	15	A
I_{FM}	Diode pulsed current	$T_C = 25^\circ\text{C}$	150	A
V_{GE}	Gate-Emitter voltage	$T_{VJ} = 25^\circ\text{C}$	± 20	V
P_{tot}	Power Dissipation	$T_C = 25^\circ\text{C}$	250	W
		$T_C = 100^\circ\text{C}$	125	W
T_{VJ}	Operating Junction Temperature Range		-40 to +175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		-55 to +150	$^\circ\text{C}$



Thermal Resistance

Symbol	Parameter	Conditions	Max.	Unit
$R_{\theta JA}$	Thermal resistance: junction - ambient		60	°C/W
$R_{\theta JC}$	IGBT Thermal resistance: junction - case	IGBT	1.5	°C/W
$R_{\theta JC}$	Diode Thermal resistance: junction - case	Diode	2.0	°C/W

Electrical Characteristics (@ $T_{VJ} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{(BR)CES}	Collector - Emitter Breakdown Voltage	V _{GE} = 0V , I _C = 0.5mA	650	-	-	V
V _{CESAT}	Collector - Emitter Saturation Voltage	V _{GE} = 15V , I _C = 15A	-	1.79	-	V
		V _{GE} = 15V , I _C = 15A ,T _{VJ} = 125°C	-	2.2	-	V
		V _{GE} = 15V , I _C = 15A ,T _{VJ} = 175°C	-	2.4	-	V
V _F	Diode forward voltage	V _{GE} = 0V , I _C = 15A	-	1.68	-	V
		V _{GE} = 0V , I _C = 15A ,T _{VJ} = 125°C	-	1.48	-	V
		V _{GE} = 0V , I _C = 15A ,T _{VJ} = 175°C	-	1.40	-	V
V _{GE(th)}	Gate-Emitter threshold voltage	V _{GE} = V _{CE} , I _C = 400μA	-	6.4	-	V
I _{CES}	Zero Gate voltage Collector current	V _{CE} = 650V , V _{GE} = 0V	-	-	1.0	μA
I _{GES}	Gate-Emitter leakage current	V _{GE} = ±20V , V _{CE} = 0V	-	-	±100	nA
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{GE} = 0V, V _{CE} = 25V, f = 1MHz	-	1470	-	pF
C _{oes}	Output Capacitance		-	34	-	pF
C _{res}	Reverse Transfer Capacitance		-	11	-	pF
R _G	Gate input resistance	f = 1M HZ	-	1.2	-	Ω
Q _g	Gate Charge	V _{GE} = 0 to 15V V _{CE} = 520V, I _C = 15A	-	51	-	nC
Q _{ge}	Gate to Emitter charge		-	8	-	nC
Q _{gc}	Gate to Collector charge		-	20	-	nC
Q _{gth}	Gate to collector charge		-	7	-	nC
L _E	Internal Emitter Inductance		-	13	-	nH
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	Tvj = 25 °C V _{GE} = 15V, V _{CC} = 400V I _C =15A, R _G = 39Ω	-	46	-	ns
t _r	Turn-On Rise Time		-	32	-	ns
t _{d(off)}	Turn-Off DelayTime		-	156	-	ns
t _f	Turn-Off Fall Time		-	40	-	ns
E _{on}	Turn-on energy		-	0.4	-	mJ
E _{off}	Turn-off energy		-	0.19	-	mJ
E _{ts}	Total switching energy		-	0.59	-	mJ
Diode Recovery Characteristics						
T _{rr}	Reverse recovery time	T _{vj} = 25 °C V _{CE} =400V,I _C =15A,V _{GE} =15V R _G =39Ω	-	159	-	ns
Q _{rr}	Reverse recovery charge		-	0.65	-	μC
I _{rrm}	Peak reverse recovery current		-	7.8	-	A
E _{res}	Reverse recovery energy		-	-420	-	mJ

Notes: 1. The max Collector current rating is package limited



Typical Performance Characteristics

Fig.1 Output characteristics(25°C)

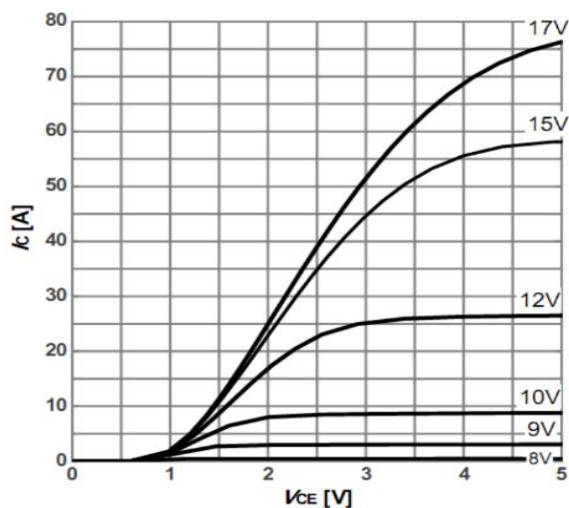


Fig.2 Saturation Voltage vs. V_{GE} (25°C)

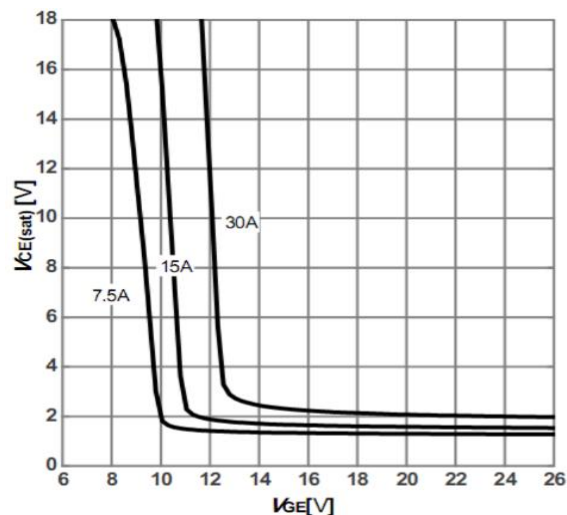


Fig.3 Reverse Bias SOA (25°C)

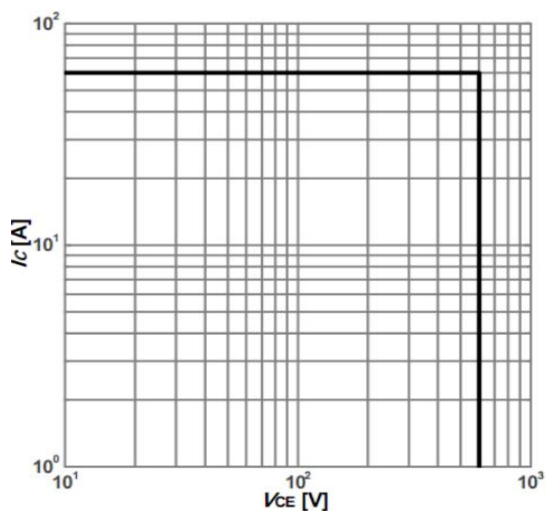


Fig.4 Transfer characteristics

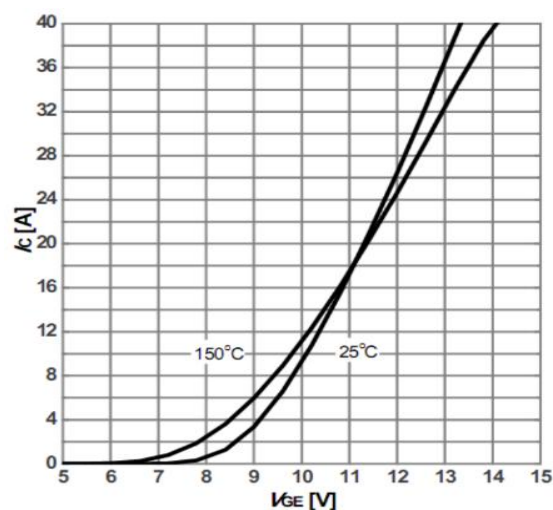


Fig.5 Gate charge

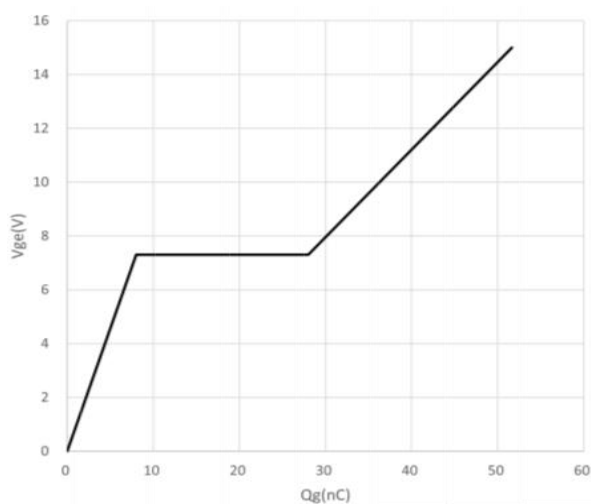
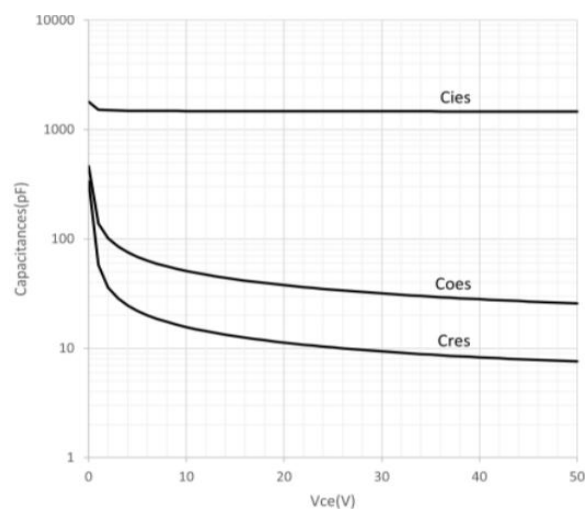
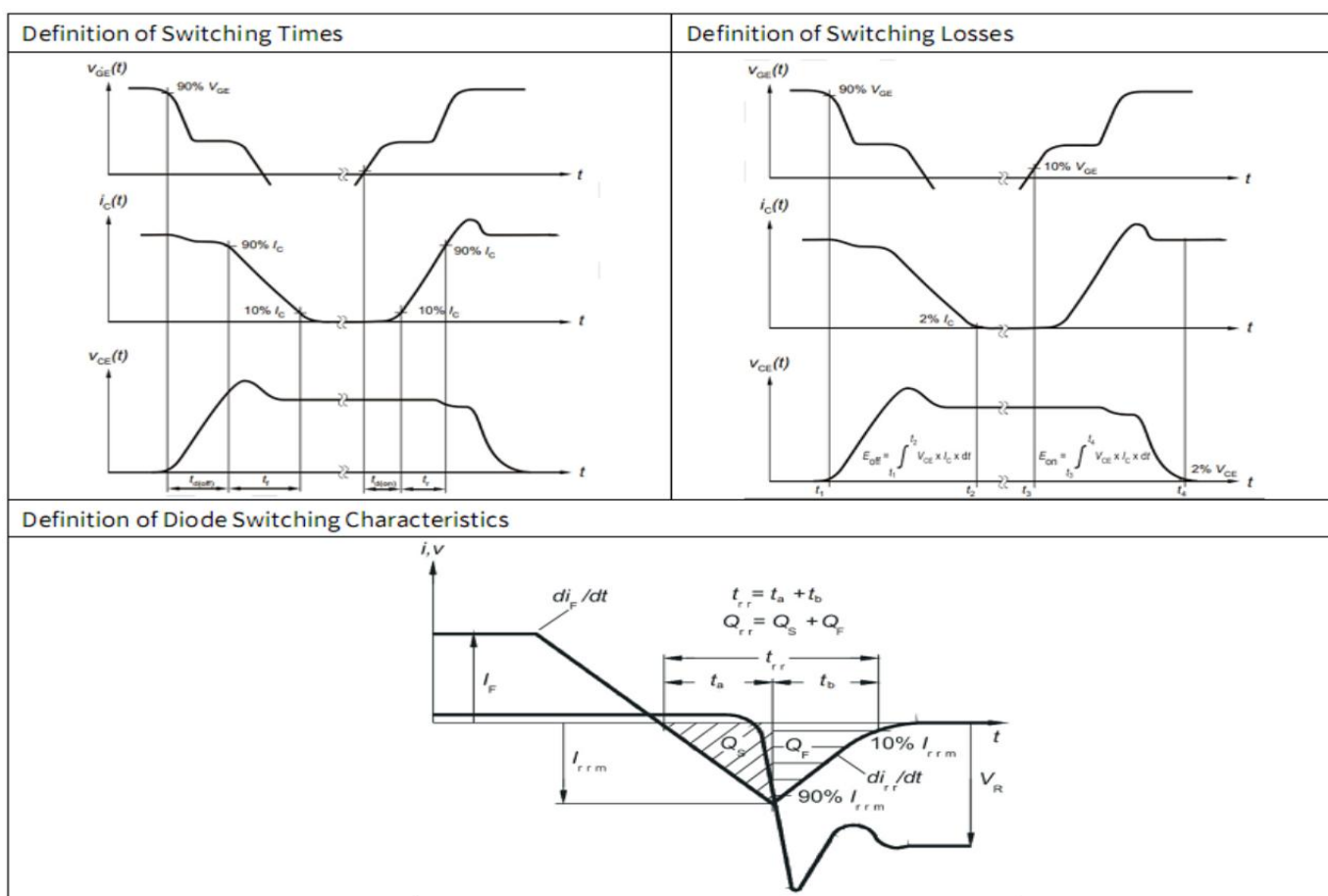
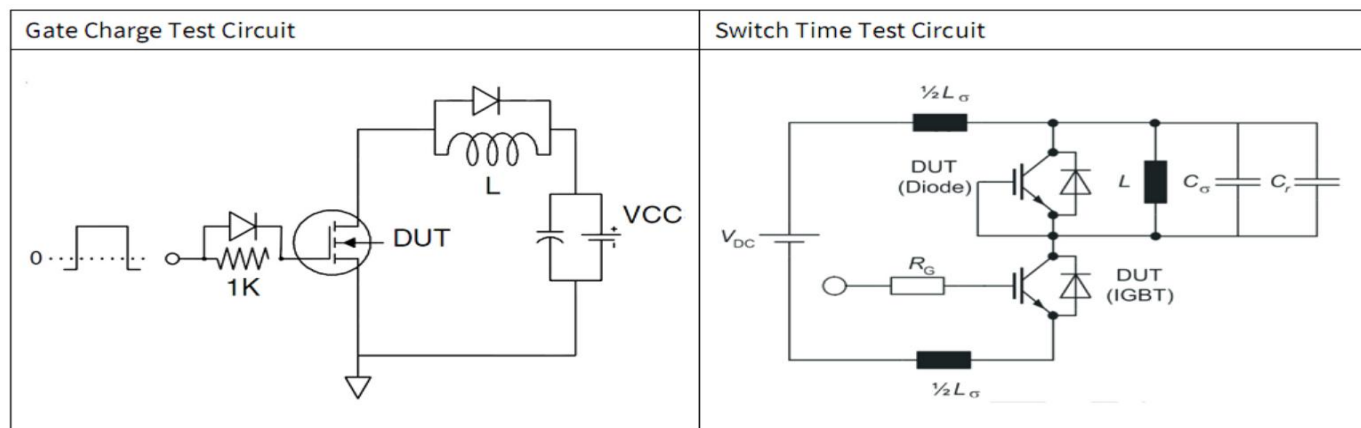


Fig.6 Typical capacitance



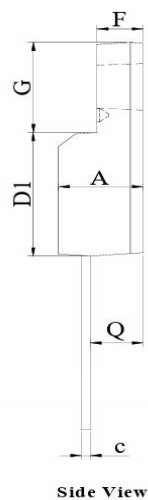
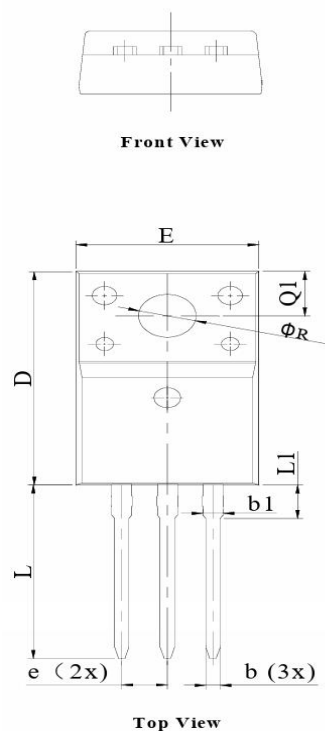


Test Circuit





Package Mechanical Data(TO-220F)



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.50	4.70	4.90
D	15.20	15.87	16.10
D1	8.80	--	9.50
E	9.70	10.10	10.40
F	2.44	--	2.75
b	0.70	0.80	0.91
b1	1.10	1.35	1.55
c	0.45	0.50	0.65
e	2.54 BSC		
G	6.40	6.70	6.90
L	12.00	13.10	14.50
L1	3.13	--	3.57
Q	2.60	2.75	2.85
Q1	3.20	3.30	3.40
R	3.05	--	3.28



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