

General Description

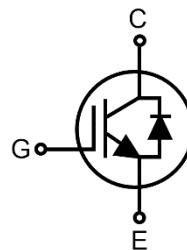
This IGBT is produced using advanced Magnachip's Field Stop Trench IGBT Technology, which provides low $V_{CE(sat)}$, high switching performance and excellent quality.

Features

- $V_{CE(sat)} = 1.65V @ I_C = 75A$
- Low Switching Loss
- Very soft, fast recovery anti-parallel diode
- Maximum Junction Temperature 175°C

Applications

- PV Inverter
- ESS



Package outline and symbol

- G : Gate
- C : Collector
- E : Emitter

Absolute Maximum Ratings

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	650	V
Gate-emitter voltage		V_{GE}	±20	V
DC collector current ¹⁾	$T_C=25^\circ C$	I_C	80	A
	$T_C=100^\circ C$		75	A
Pulsed collector current, t_p limited by T_{vjmax}		I_{Cpuls}	225	A
Diode forward current ¹⁾	$T_C=25^\circ C$	I_F	80	A
	$T_C=100^\circ C$		57	A
Diode pulsed current, t_p limited by T_{vjmax}		I_{Fpuls}	225	A
Total power dissipation	$T_C=25^\circ C$	P_{tot}	319	W
	$T_C=100^\circ C$		159	W
Operating Junction temperature range		T_{vj}	-40~175	°C
Storage temperature range		T_{stg}	-55~150	°C

Note 1) Current is limited by junction temperature & bondwires.

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal resistance junction-to-ambient	$R_{th(j-a)}$	40	°C/W
Thermal resistance junction-to-case for IGBT	$R_{th(j-c)}$	0.47	
Thermal resistance junction-to-case for Diode	$R_{th(j-c)}$	0.77	

Ordering Information

Part Number	Marking	Temp. Range	Package	Packing	RoHS Status
MBQ75T65S6FSTH	75T65S6FS	-55~150°C	TO-247	Tube	Compliant

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

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Static Characteristics							
Collector-emitter breakdown voltage	BV_{CES}	$I_C = 0.1\text{mA}$, $V_{GE} = 0\text{V}$		650	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 75\text{A}$, $V_{GE} = 15\text{V}$	$T_{vj} = 25^\circ\text{C}$	-	1.65	2.10	V
			$T_{vj} = 175^\circ\text{C}$	-	2.15	-	
Diode forward voltage	V_F	$V_{GE} = 0\text{V}$, $I_F = 75\text{A}$	$T_{vj} = 25^\circ\text{C}$	-	1.70	2.20	V
			$T_{vj} = 175^\circ\text{C}$	-	1.70	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$, $I_C = 1\text{mA}$		4.0	5.0	6.0	V
Zero gate voltage collector current	I_{CES}	$V_{CE} = 650\text{V}$, $V_{GE} = 0\text{V}$		-	-	200	μA
Gate-emitter leakage current	I_{GES}	$V_{GE} = 20\text{V}$, $V_{CE} = 0\text{V}$		-	-	± 250	nA

Dynamic Characteristics

Total gate charge	Q_G	$V_{CE} = 520\text{V}$, $I_C = 75\text{A}$, $V_{GE} = 15\text{V}$	-	112	-	nC
Gate-emitter charge	Q_{GE}		-	22	-	
Gate-collector charge	Q_{GC}		-	41	-	
Input capacitance	C_{ies}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 100\text{kHz}$	-	3221	-	pF
Output capacitance	C_{oes}		-	201	-	
Reverse transfer capacitance	C_{res}		-	26	-	

Switching Characteristics

Turn-on delay time	$t_{d(on)}$	$V_{GE} = 0/15\text{V}$, $V_{CC} = 400\text{V}$, $I_C = 75\text{A}$, $R_G = 10\Omega$, Inductive Load, $T_{vj} = 25^\circ\text{C}$	-	36.4	-	ns
Rise time	t_r		-	68.7	-	
Turn-off delay time	$t_{d(off)}$		-	150.8	-	
Fall time	t_f		-	54.2	-	
Turn-on switching energy	E_{on}		-	2.87	-	mJ
Turn-off switching energy	E_{off}	$V_{GE} = 0/15\text{V}$, $V_{CC} = 400\text{V}$, $I_C = 75\text{A}$, $R_G = 10\Omega$, Inductive Load, $T_{vj} = 175^\circ\text{C}$	-	0.79	-	
Total switching energy	E_{ts}		-	3.66	-	
Turn-on delay time	$t_{d(on)}$		-	36.6	-	ns
Rise time	t_r		-	77.5	-	
Turn-off delay time	$t_{d(off)}$		-	162.7	-	
Fall time	t_f		-	59.7	-	
Turn-on switching energy	E_{on}		-	4.00	-	mJ
Turn-off switching energy	E_{off}	$I_F = 75\text{A}$, $di_F/dt = 200\text{A}/\mu\text{s}$, $T_{vj} = 25^\circ\text{C}$	-	1.07	-	
Total switching energy	E_{ts}		-	5.07	-	
Reverse recovery time	t_{rr}		-	139.6	-	ns
Reverse recovery current	I_{rr}		-	12.5	-	A
Reverse recovery charge	Q_{rr}		-	0.9	-	μC
Reverse recovery time	t_{rr}	$I_F = 75\text{A}$, $di_F/dt = 200\text{A}/\mu\text{s}$, $T_{vj} = 175^\circ\text{C}$	-	248.2	-	ns
Reverse recovery current	I_{rr}		-	19.4	-	A
Reverse recovery charge	Q_{rr}		-	2.6	-	μC

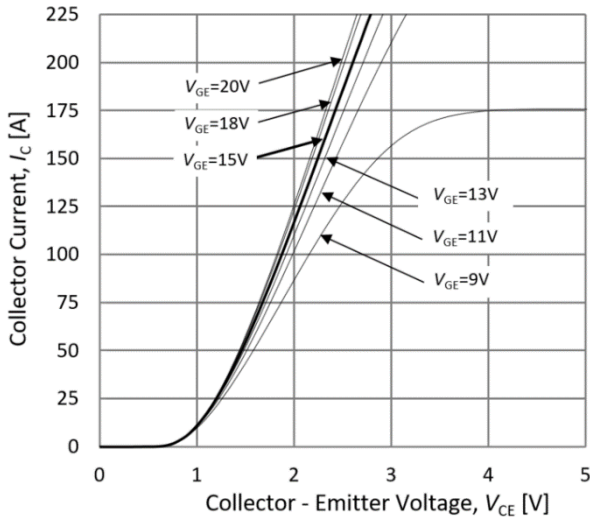


Fig.1. Typical output characteristics ($T_{vj}=25^{\circ}\text{C}$)

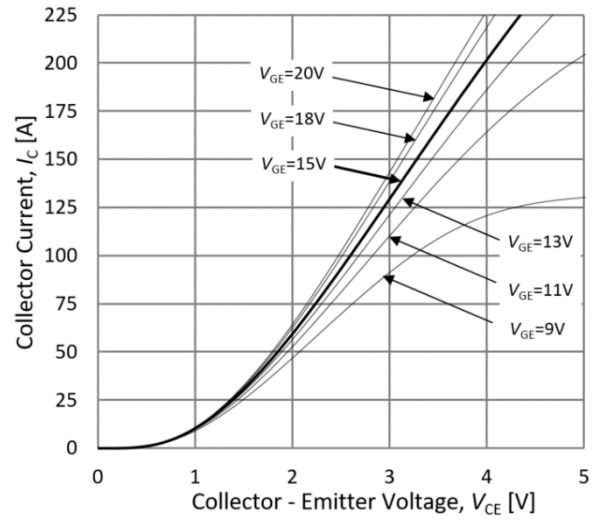


Fig.2. Typical output characteristics ($T_{vj}=175^{\circ}\text{C}$)

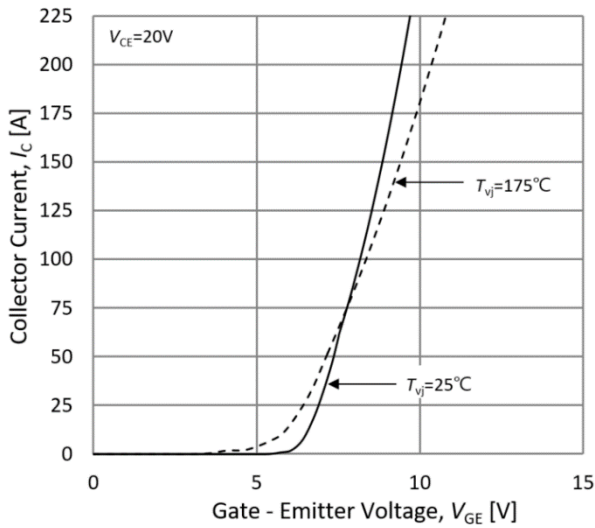


Fig.3. Typical transfer characteristics

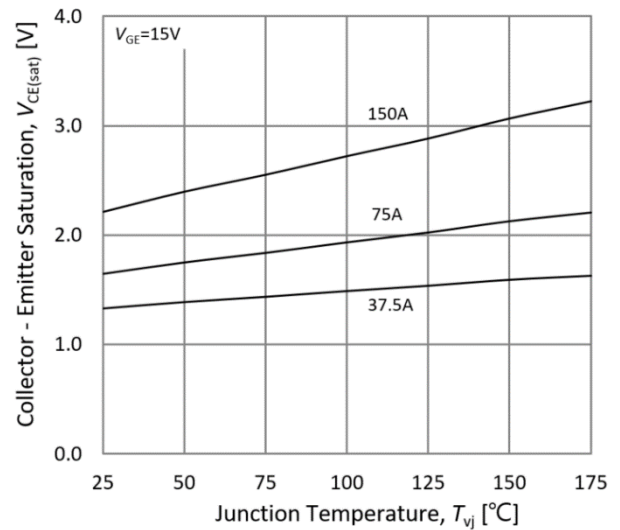


Fig.4. Typical collector-emitter saturation voltage-junction temperature

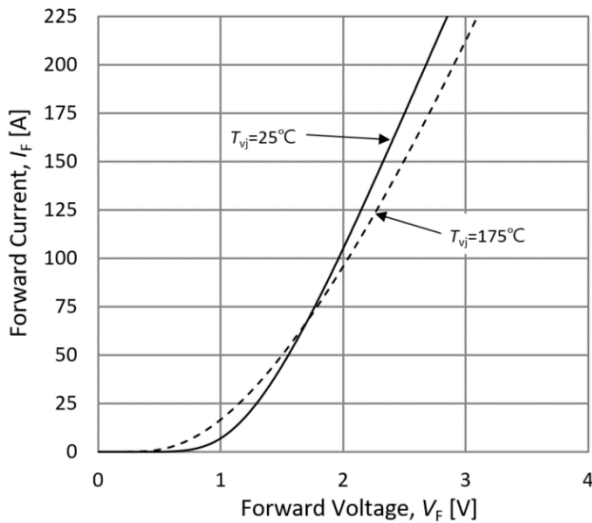


Fig.5. Diode forward characteristics

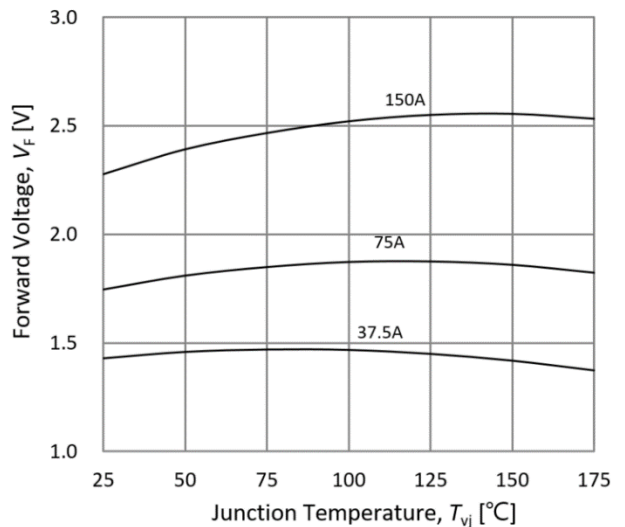


Fig.6. Diode forward voltage-junction temperature

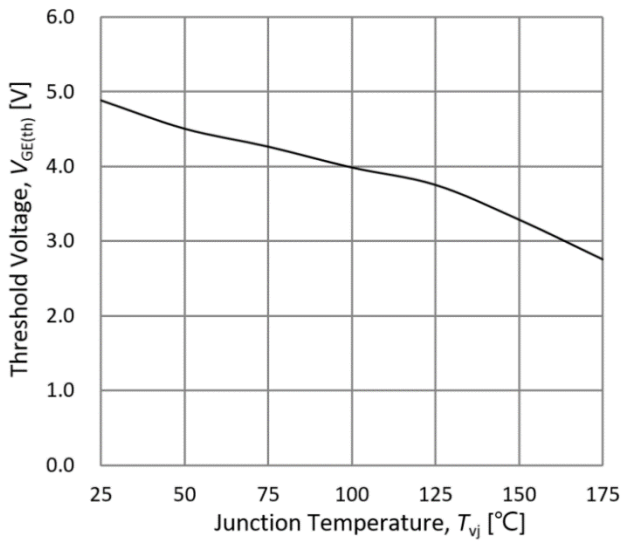


Fig.7. Threshold voltage-junction temperature

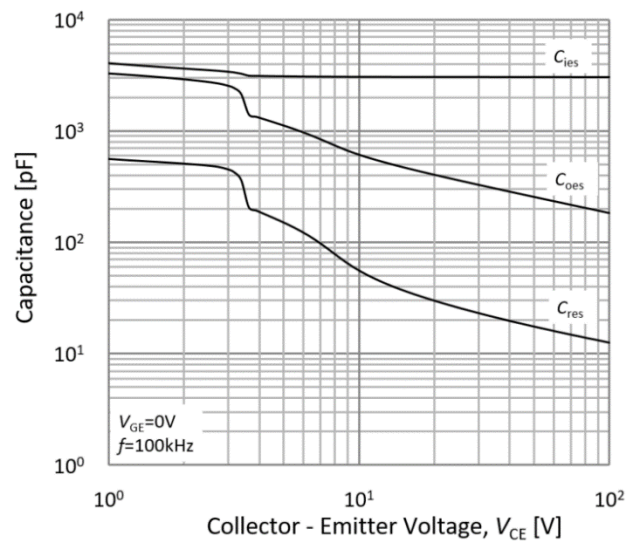


Fig.8. Typical capacitance

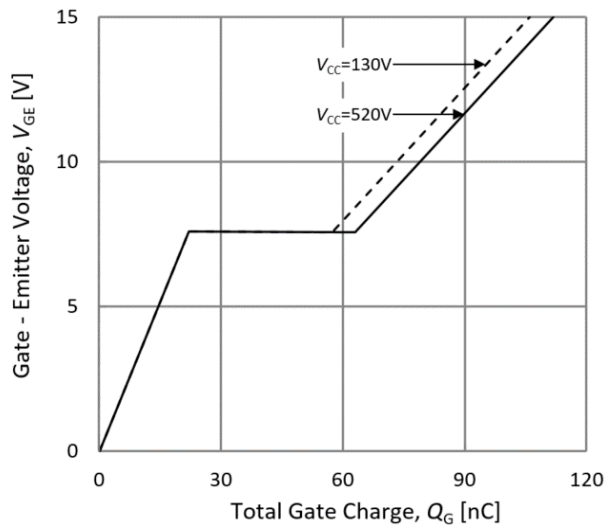


Fig.9. Typical gate charge

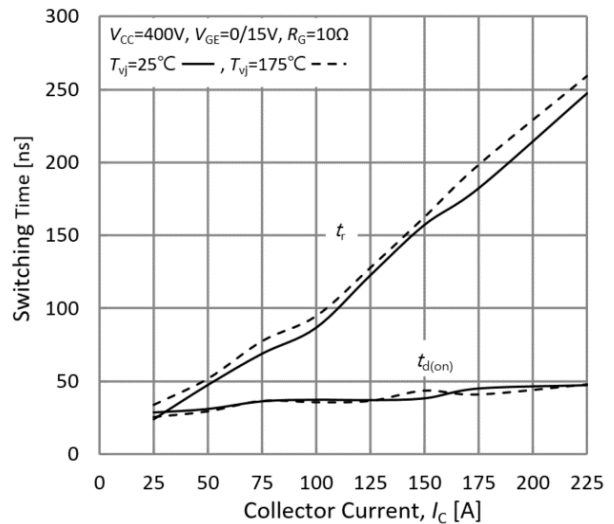


Fig.10. Typical turn on times-collector current

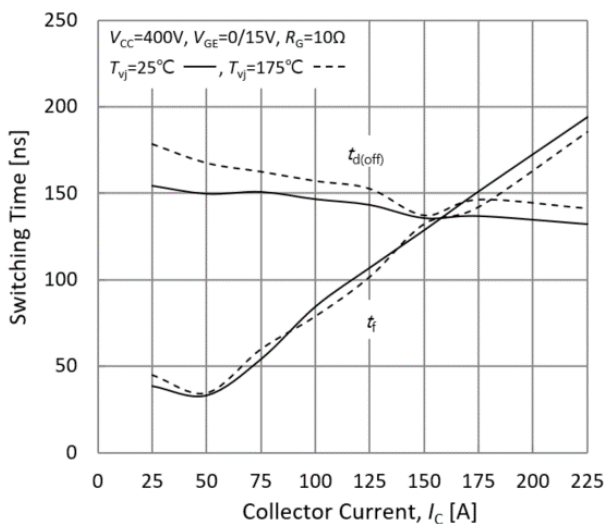


Fig.11. Typical turn off times-collector current

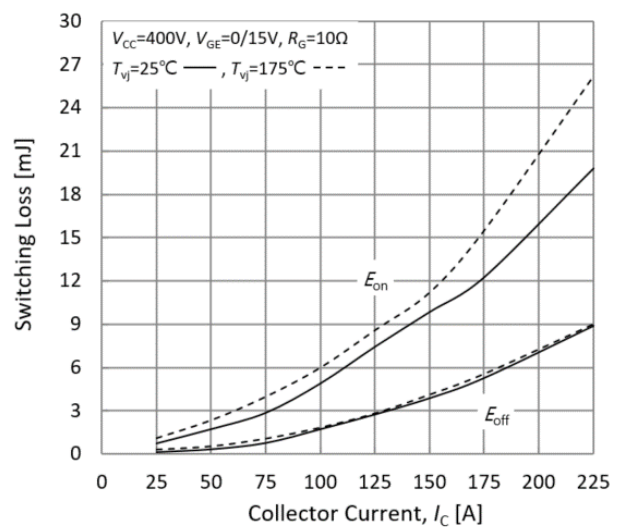


Fig.12. Switching losses-collector current

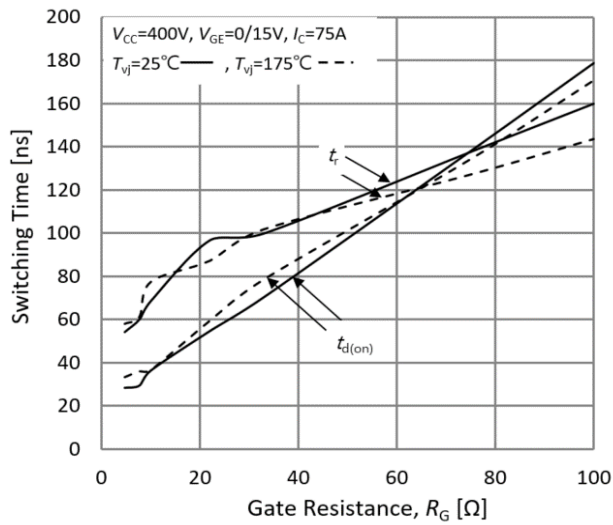


Fig.13. Typical turn on times-gate resistance

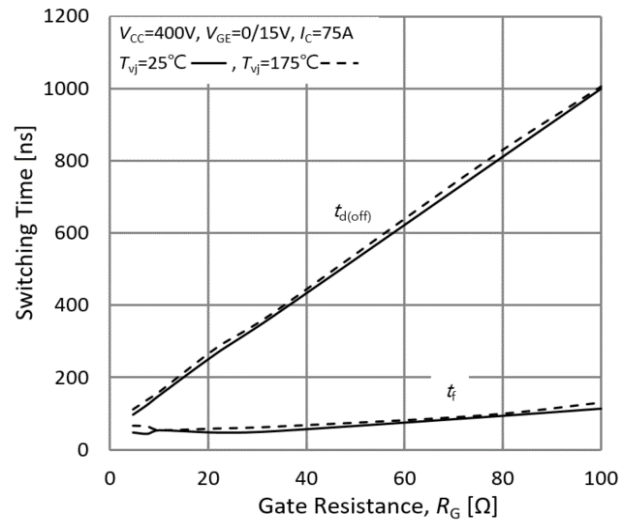


Fig.14. Typical turn off times-gate resistance

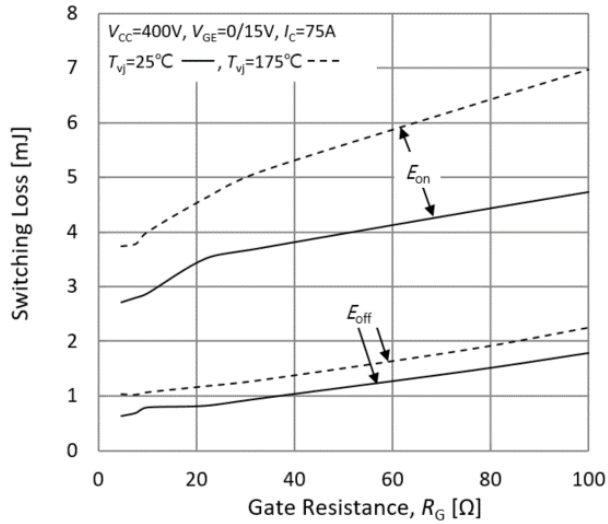


Fig.15. Switching losses-gate resistance

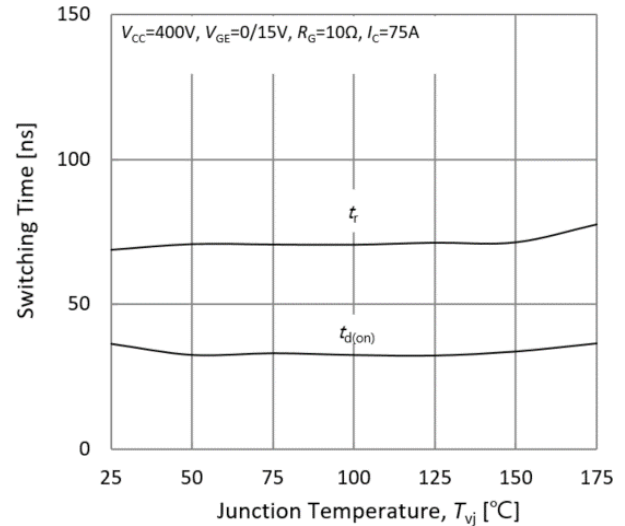


Fig.16. Typical turn on times-junction temperature

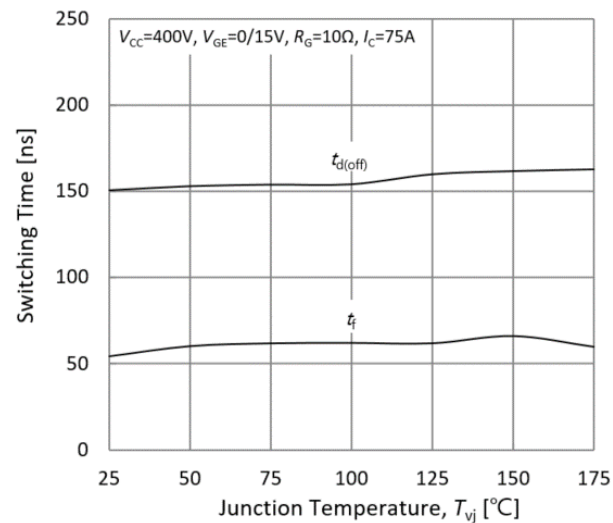


Fig.17. Typical turn off times-junction temperature

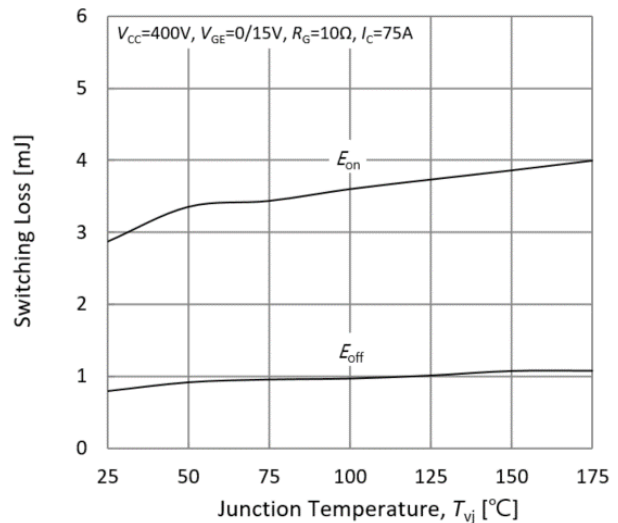
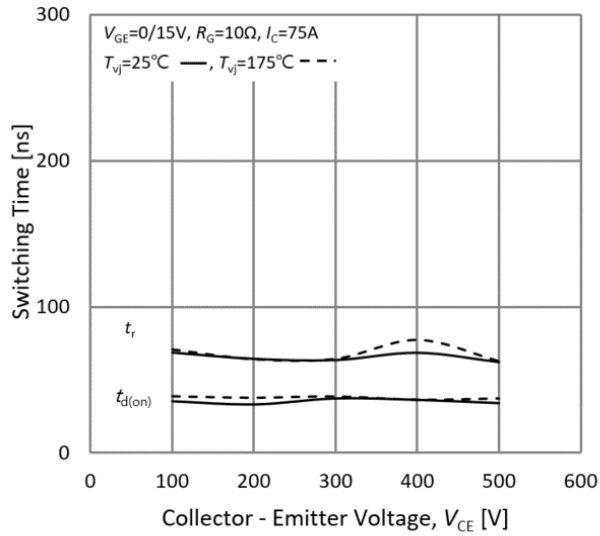
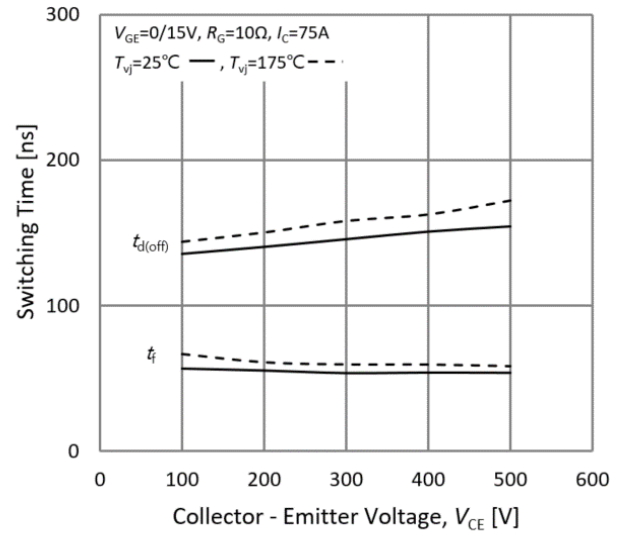


Fig.18. Switching losses-junction temperature



**Fig.17. Typical turn on times
-collector emitter voltage**



**Fig.18. Typical turn off times
-collector emitter voltage**

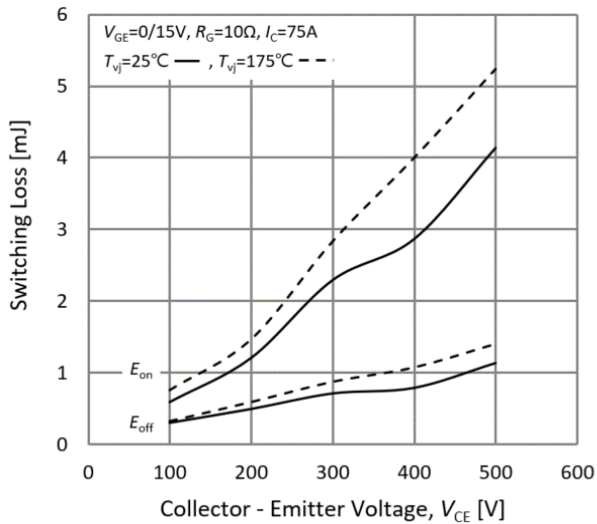


Fig.19. Switching losses-collector emitter voltage

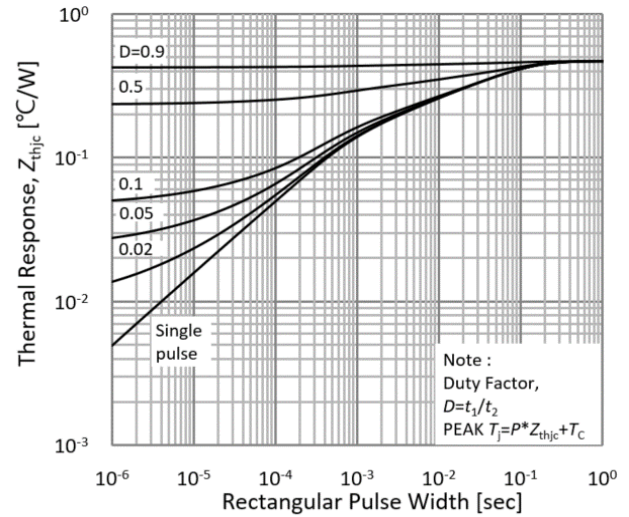


Fig.19. IGBT transient thermal impedance

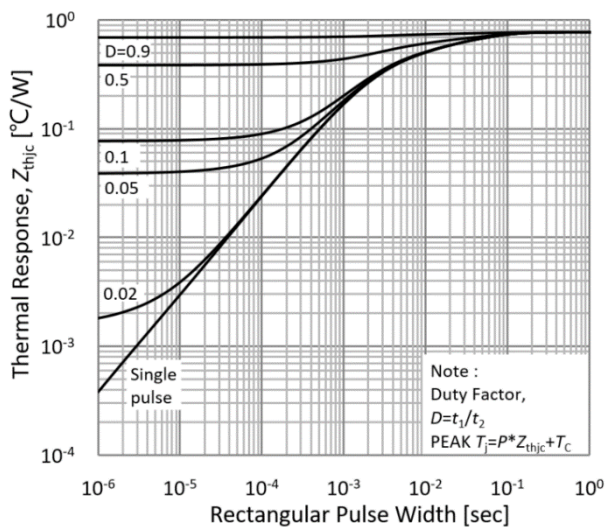


Fig.20. Diode transient thermal impedance

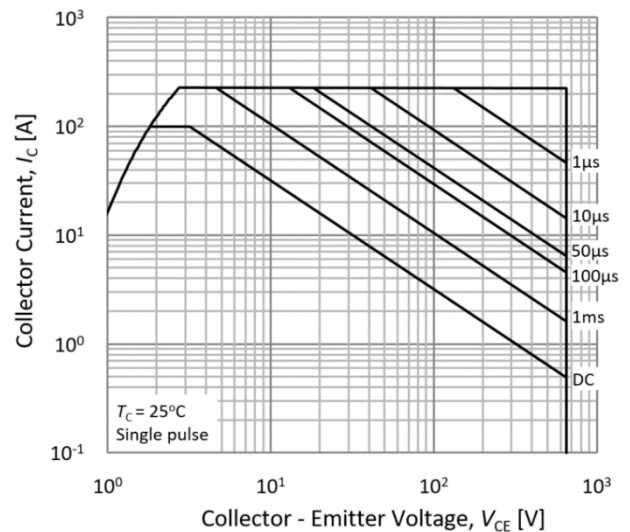


Fig.21. FBSOA

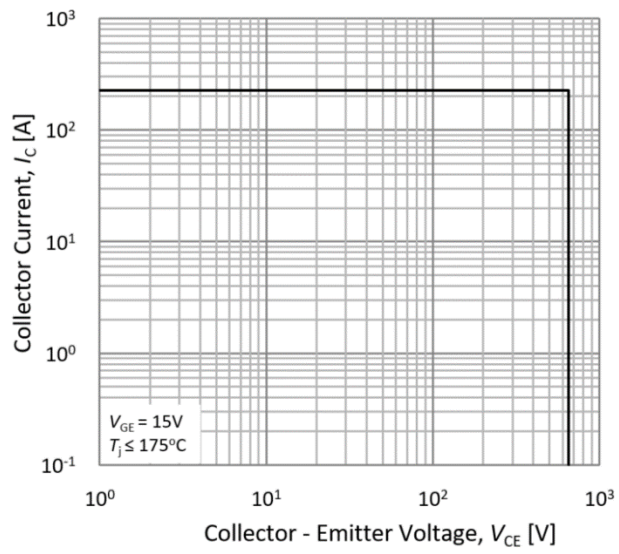
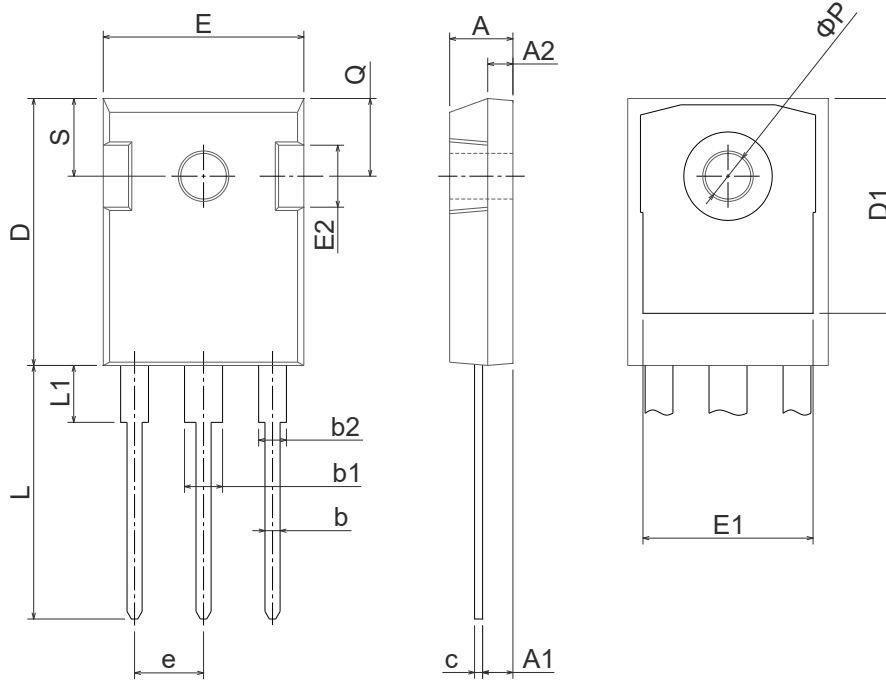


Fig.22. RBSOA

Physical Dimension

TO-247

Dimensions are in millimeters, unless otherwise specified



Dimension	Min(mm)	Max(mm)
A	4.70	5.31
A1	2.20	2.60
A2	1.50	2.49
b	0.99	1.40
b1	2.59	3.43
b2	1.65	2.39
c	0.38	0.89
D	20.30	21.46
D1	13.08	-
E	15.45	16.26
E1	13.06	14.02
E2	4.32	5.49
e	5.45BSC	
L	19.81	20.57
L1	-	4.50
ΦP	3.50	3.70
Q	5.38	6.20
S	6.15BSC	

Note: Package body size, length and width do not include mold flash, protrusions and gate burrs.



DISCLAIMER:

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