

TP030N065WED/FED

N-CHANNEL IGBT

MAIN CHARACTERISTICS

I_C	30 A
V_{CES}	650V
$V_{cesat-typ}$ (@ $V_{ge}=15V$)	1.75V

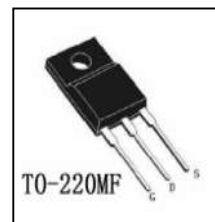
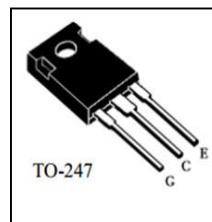
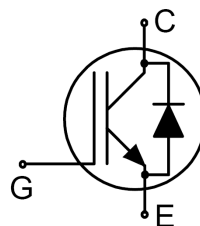
APPLICATIONS

- General purpose inverters
- UPS

FEATURES

- Low gate charge
- Trench FS Technology,
- saturation voltage:
 $V_{CE(sat), typ} = 1.75V @ I_C = 30A$ and $TC = 25^\circ C$
- RoHS product

Package



ORDER MESSAGE

Order codes				Marking	Package
Halogen-Tube	Halogen-Free-Tube	Halogen-Reel	Halogen-Free-Reel		
TP030N065WED-GE-B	TP030N065WED-GE-BR	N/A	N/A	030N065WED	TO-247
TP030N065FED-F-B	TP030N065FED-F-BR	N/A	N/A	030N065FED	TO-220MF

ABSOLUTE RATINGS (Tc=25°C)

Parameter	Symbol	Value		Unit
		TP030N065WED	TP030N065FED	
Collector-Emmitter Voltage	V_{CES}	650		V
Collector Current-continuous	I_C T=25°C T=100°C	60		A
		30		A
Collector Current – pulse (note 1)	I_{CM}	120		A
Gate-Emmitter Voltage	V_{GES}	±20		V
Turn-off safe area	-	120		A
Power Dissipation	P_D T _C =25°C	195	38.7	W
Operating and Storage Temperature Range	T _J , T _{STG}	-55~+150		°C
Maximum Lead Temperature for Soldering Purposes	T _L	300		°C

*Collector current limited by maximum junction temperature

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off –Characteristics						
Collector-Emmitter Voltage	BV_{CES}	$I_C=250\mu A, V_{GE}=0V$	650	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{CES}/\Delta T_J$	$I_C=0.5mA$, referenced to $25^\circ C$	-	0.6	-	$V/^\circ C$
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_C=25^\circ C$	-	-	0.2	mA
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=20V$	-	-	200	nA
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-20V$	-	-	-200	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C=250\mu A$	4.5	-	6.5	V
Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=30A, T_C=25^\circ C$	-	1.75	2.4	V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz$	-	1830	-	pF
Output capacitance	C_{oes}		-	160	-	pF
Reverse transfer capacitance	C_{res}		-	50.3	-	pF
Total Gate Charge	Q_g	$V_{CC}=520V, I_C=30A, R_G=7.9\Omega, V_{GE}=15V, T_C=25^\circ C$	-	64.5	-	nC
Gate to emitter charge	Q_{ge}		-	18.1	-	
Gate to collector charge	Q_{gc}		-	23.7	-	
Gate resistance	R_g	$f=1 MHz$, open collector	-	1.1	-	Ω
short current	I_{sc}	$V_{GE}=15V, V_{CE}=360V, t_{sc} < 5\mu s$	-	172	-	A

ELECTRICAL CHARACTERISTICS

Switching Characteristics						
Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Turn-On delay time	t _d (on)	V _{CC} =400V,I _c =30A,R _G =7.9Ω V _{GE} =15 V T _C =25°C	-	27.0	-	ns
Turn-On rise time	t _r		-	67.0	-	ns
Turn-Off delay time	t _d (off)		-	67.0	-	ns
Turn-Off Fall time	t _f		-	44.0	-	ns
Turn-On energy	Eon		-	0.83	-	mJ
Turn-off energy	Eoff		-	0.36	-	mJ
Total switching energy	Etot		-	1.19	-	mJ
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _F	V _{GE} =0V, I _S =20A	-	1.5	2.2	V
Diode Reverse recovery time	t _{rr}	V _{GE} =0V, V _R =400V I _F =30A dI _F /dt=100A/μs (note 4) T _C =25°C	-	155	-	ns
Diode Reverse recovery charge	Q _{rr}		-	85.0	-	nC
Diode Reverse recovery Current	I _{RRM}		-	1.14	-	A
Diode Reverse recovery time	t _{rr}	V _{GE} =0V, V _R =400V I _F =30A dI _F /dt=100A/μs (note 4) T _C =175°C	-	307	-	ns
Diode Reverse recovery charge	Q _{rr}		-	685	-	nC
Diode Reverse recovery Current	I _{RRM}		-	3.98	-	A

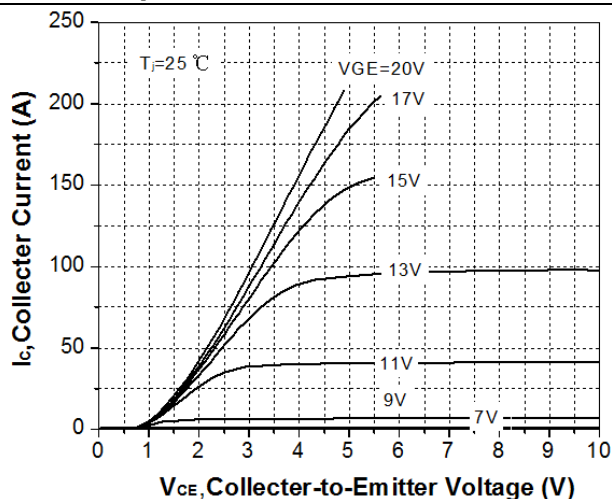
Parameter	Symbol	Typ		Unit
		TP030N065WED	TP030N065FED	
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.64	3.23	$^\circ C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	40	43.2	$^\circ C/W$

Notes:

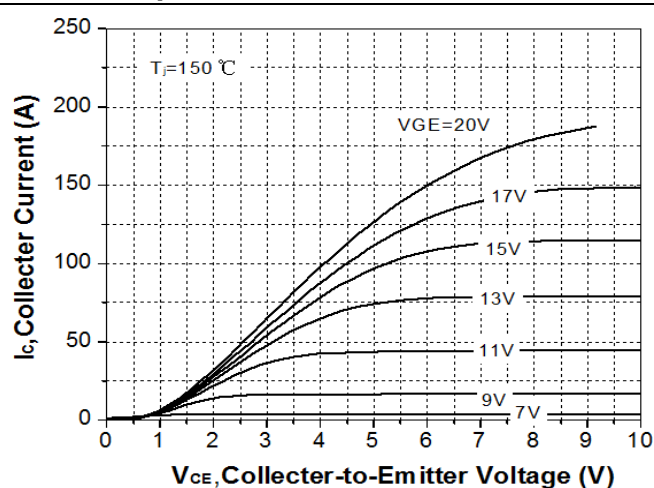
- 1: Pulse width limited by maximum junction temperature
- 2: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
- 3: Essentially independent of operating temperature

ELECTRICAL CHARACTERISTICS (curves)

Output Characteristics (25°C)

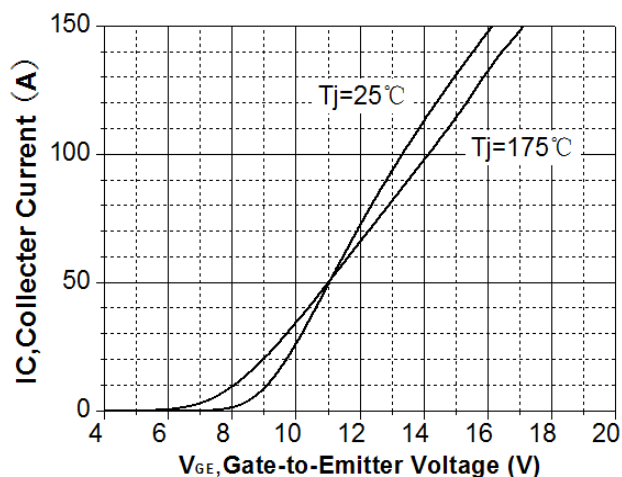


Output Characteristics (150°C)



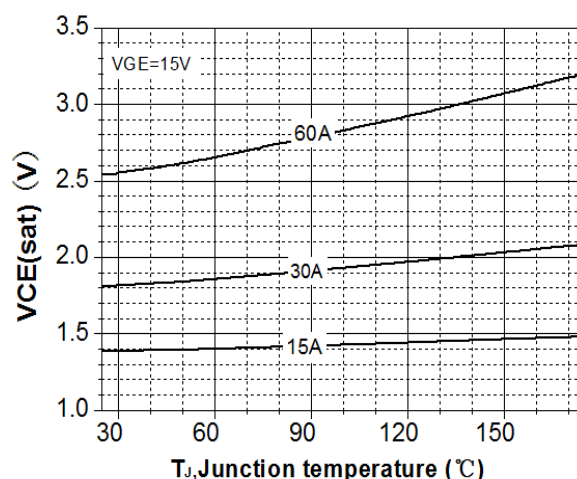
Transfer Characteristics

$V_{CE} = 20\text{ V}$



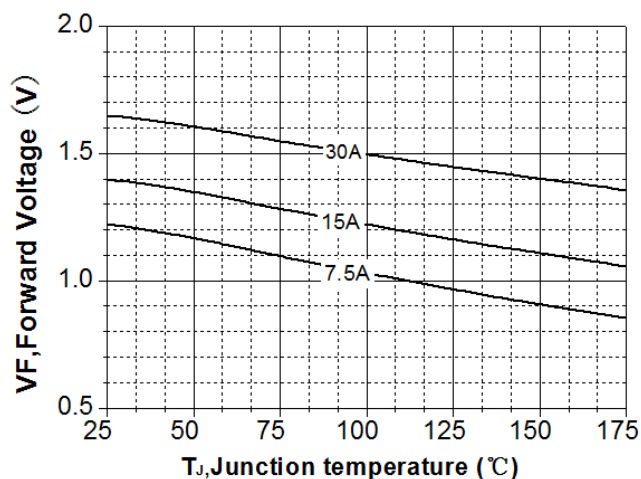
Vcesat vs. Tj

$V_{GE} = 15\text{ V}$, $I_C = 15\text{ A}$, 30 A , 60 A



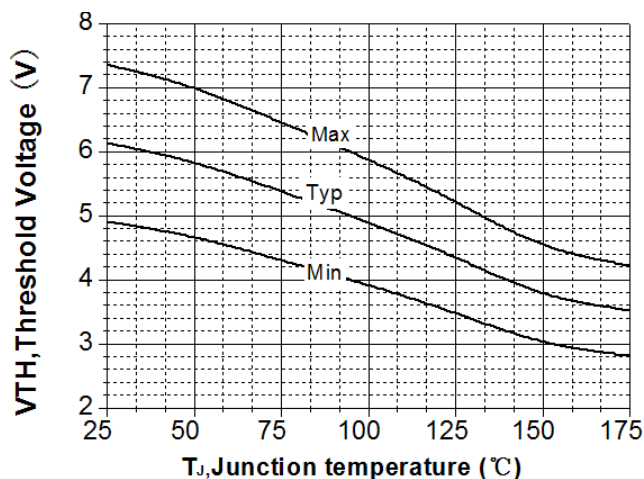
VF vs. Tj

$V_{GE} = 15\text{ V}$, $I_C = 7.5\text{ A}$, 15 A , 30 A



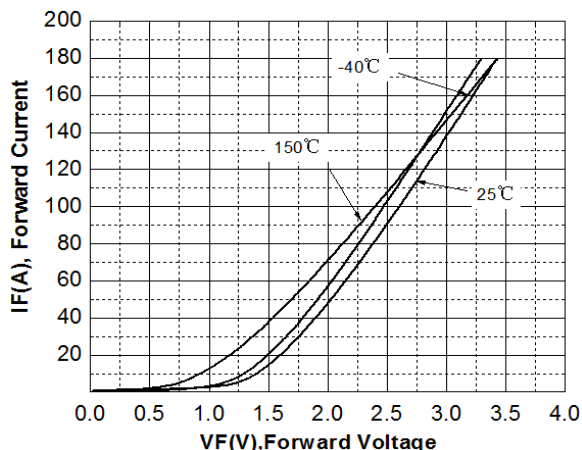
VTH vs. Tj

$I_C = 250\mu\text{A}$



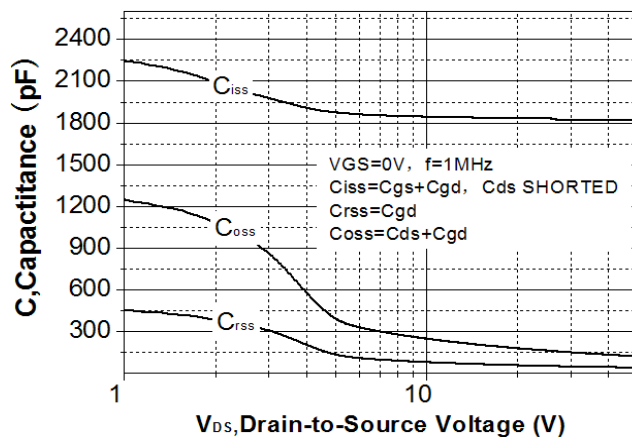
Diode Characteristic

$T_j = 25^\circ\text{C}, 150^\circ\text{C}$



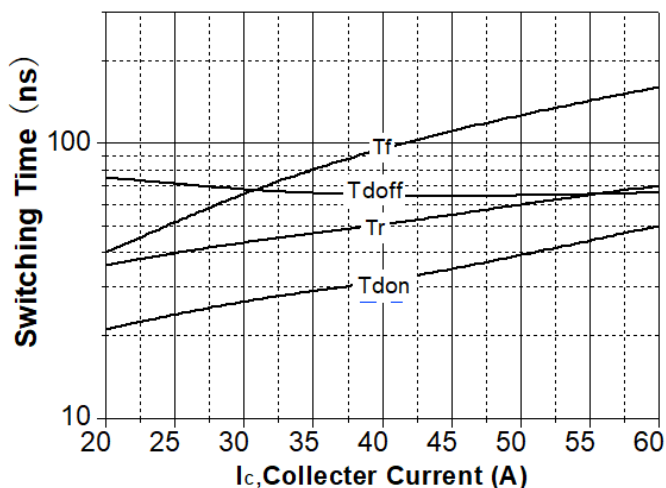
Capacitance Characteristic

$V_{ce} = 25\text{V}, V_{GE} = 0\text{V}, f = 1.0\text{MHz}$



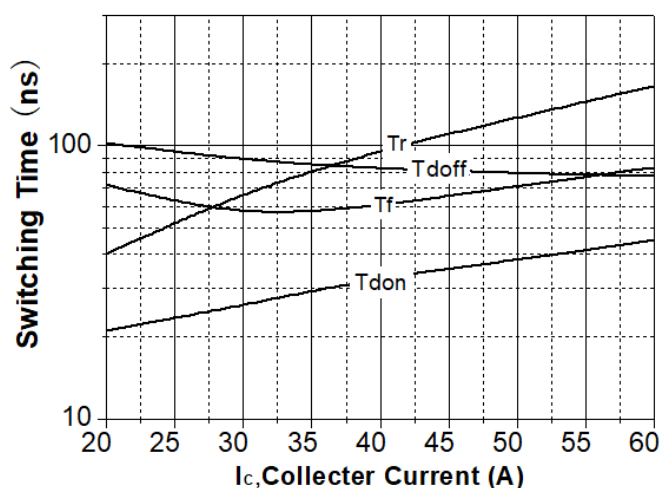
Switching Time vs. I_C (25°C)

$V_{CE} = 400\text{V}, V_{GE} = 15\text{V}, R_G = 7.9\Omega$



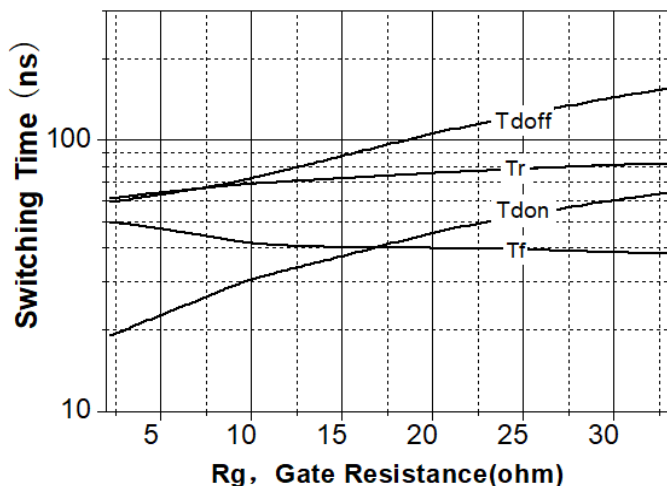
Switching Time vs. I_C (175°C)

$V_{CE} = 400\text{V}, V_{GE} = 15\text{V}, R_G = 7.9\Omega$



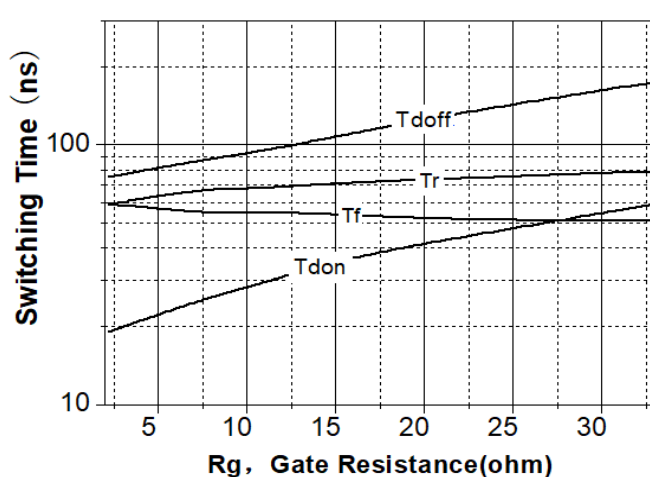
Switching Time vs. R_G (25°C)

$V_{GE} = 15\text{V}, V_{CE} = 400\text{V}, I_C = 30\text{A}$



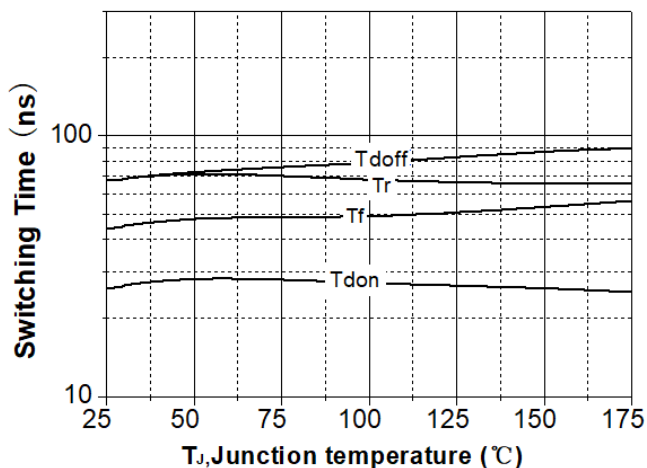
Switching Time vs. R_G (175°C)

$V_{GE} = 15\text{V}, V_{CE} = 400\text{V}, I_C = 30\text{A}$



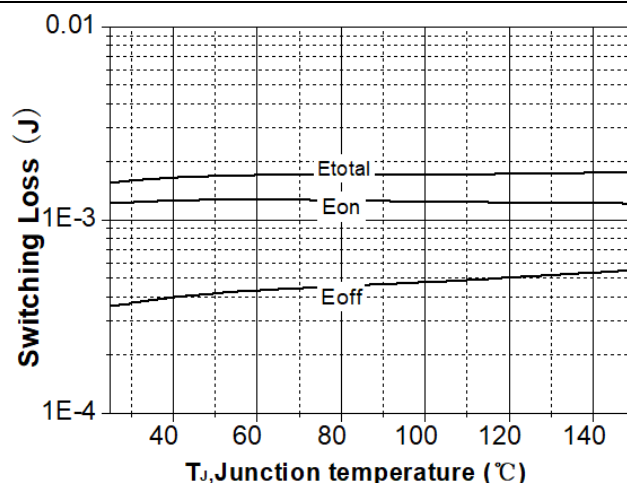
Switching Time vs. T_j

$V_{GE}=15V$, $V_{CE}=400V$, $I_C=30A$, $R_g=7.9\Omega$



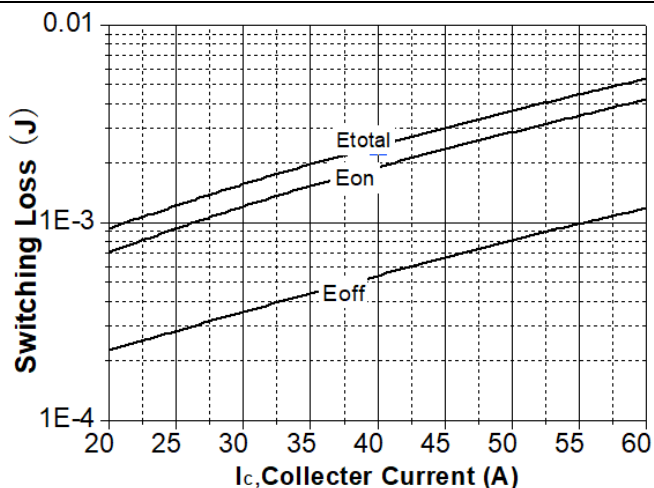
Switching Loss vs. T_j

$V_{GE}=15V$, $V_{CE}=400V$, $I_C=30A$, $R_g=7.9\Omega$



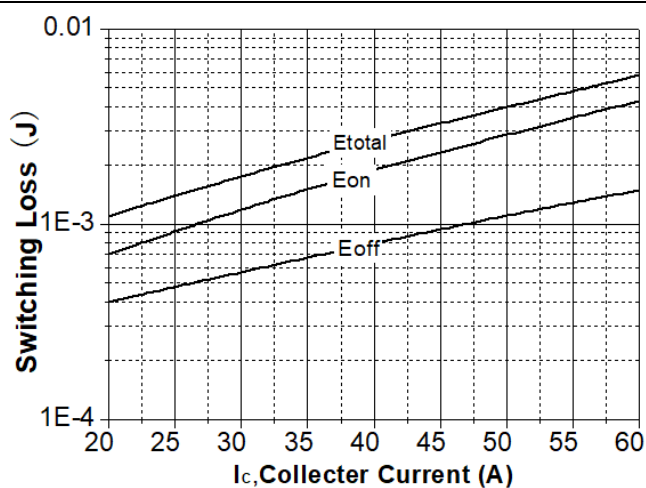
Switching Loss vs. $I_C(25^\circ C)$

$V_{GE}=15V$, $V_{CE}=400V$, $R_g=7.9\Omega$



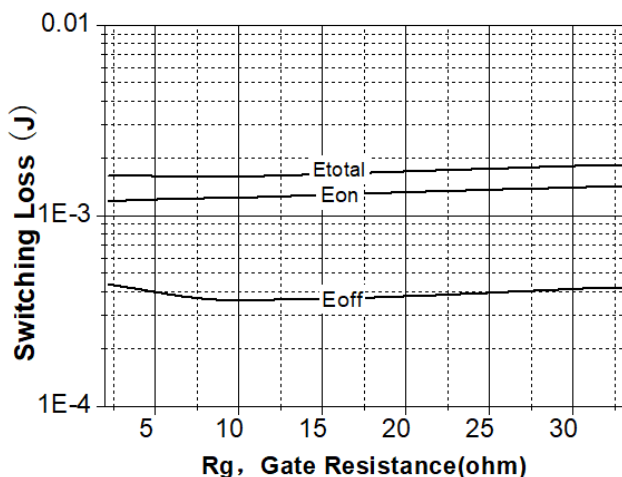
Switching Loss vs. $I_C(175^\circ C)$

$V_{GE}=15V$, $V_{CE}=400V$, $R_g=7.9\Omega$



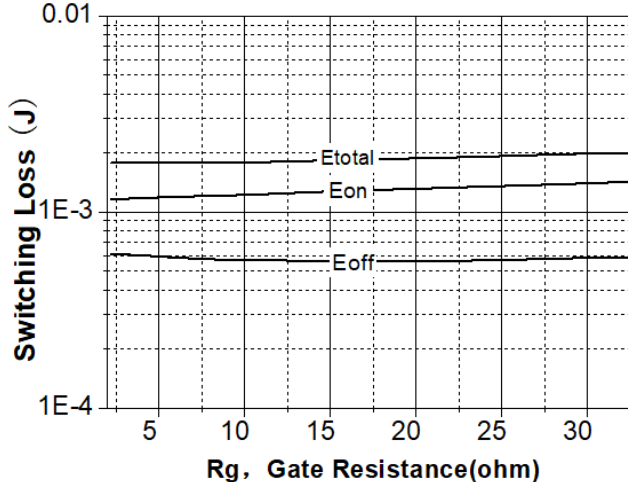
Switching Loss vs. $R_g(25^\circ C)$

$V_{GE}=15V$, $V_{CE}=400V$, $I_C=30A$



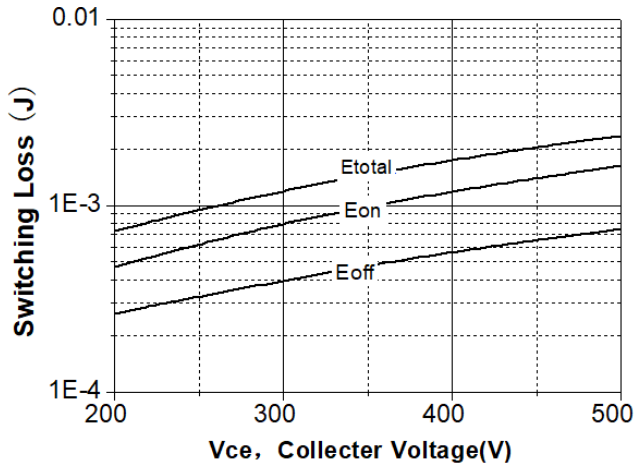
Switching Loss vs. $R_g(175^\circ C)$

$V_{GE}=15V$, $V_{CE}=400V$, $I_C=30A$



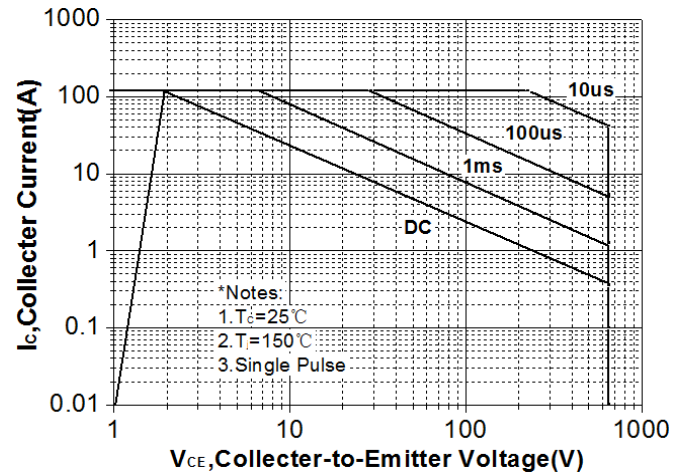
Switching Loss vs. VCE(175°C)

VGE=15V, IC:30A, Rg=7.9Ω



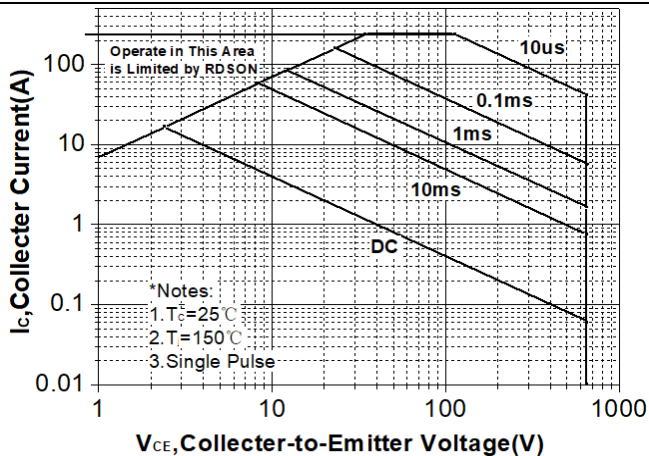
Safe Operating Area For TO-247

Tc=25°C, VGE=15V

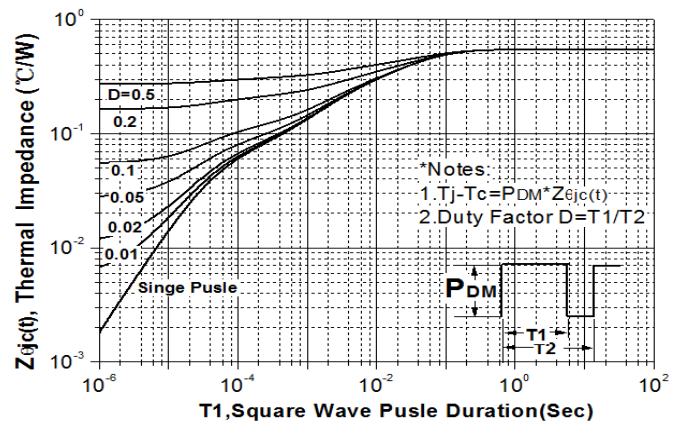


Safe Operating Area For TO-220MF

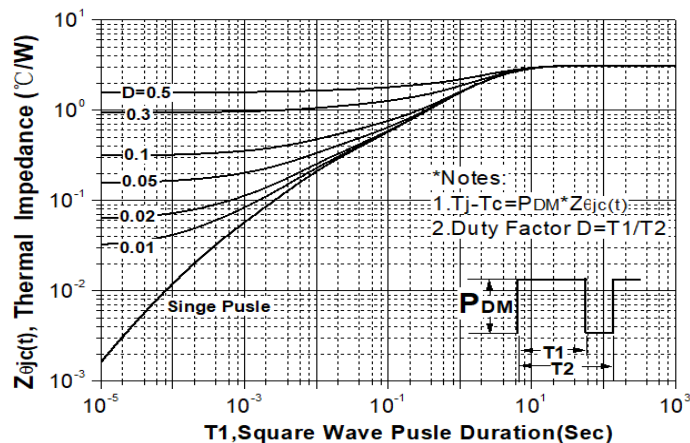
Tc=25°C, VGE=15V



Transient Thermal Impedance for TO-247



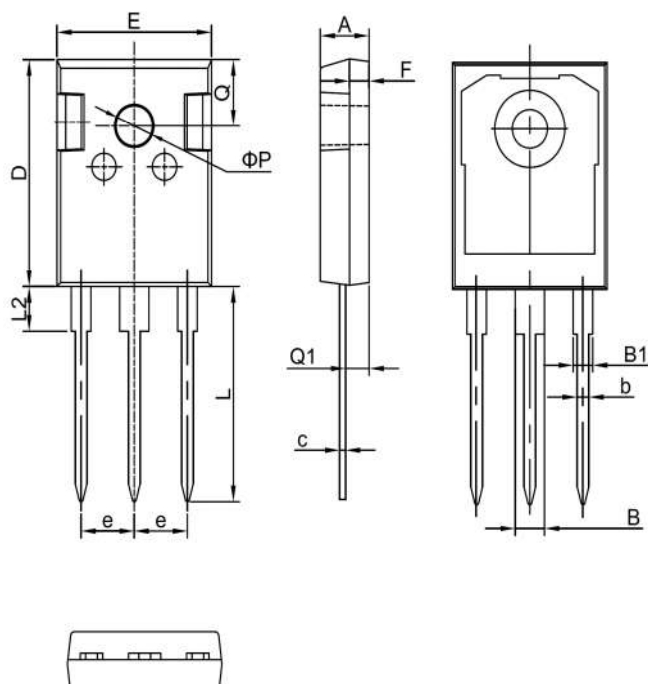
Transient Thermal Impedance for TO-220MF



PACKAGE MECHANICAL DATA

TO-247

Unit: mm

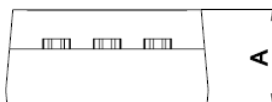
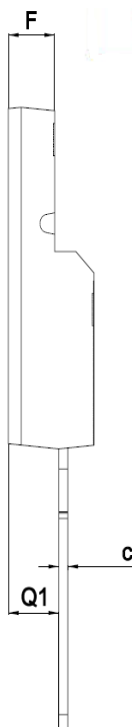
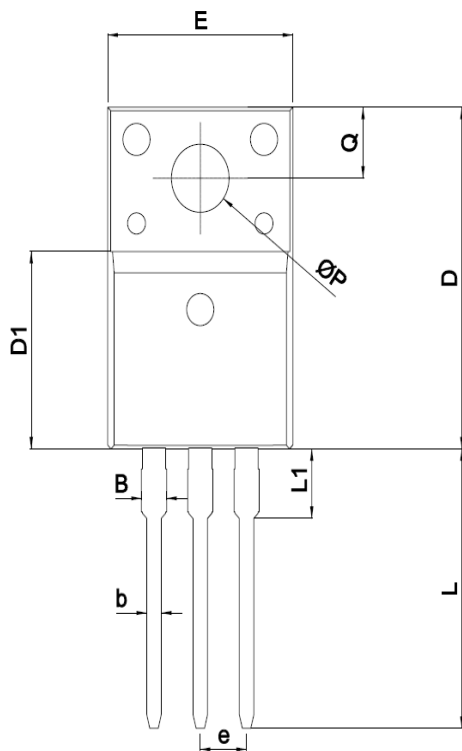


symbol	MIN	MAX
A	4.90	5.10
B	2.95	3.35
B1	1.95	2.35
b	1.15	1.35
c	0.50	0.70
D	20.90	21.10
E	15.70	15.90
e	5.34	5.54
F	1.90	2.10
L	19.40	20.40
L2	4.03	4.23
Q	6.00	6.40
Q1	2.30	2.50
P	3.50	3.70

PACKAGE MECHANICAL DATA

TO 220MF

Unit: mm



SYMBOL	mm	
	MIN	MAX
A	4.5	4.9
B		1.47
b	0.7	0.9
c	0.45	0.60
D	15.67	16.07
D1	9.04	9.20
e	2.54TYPE	
E	9.96	10.36
F	2.34	2.74
L	12.58	13.38
L1	3.13	3.33
Q	3.2	3.4
Q1	2.56	2.96
ΦP	3.08	3.28