

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Collector-Emitter Voltage		V_{CES}	1350	V
Gate-Emitter Voltage		V_{GES}	20	V
Continuous Collector Current	$T_C = 25$	I_C	60	A
	$T_C = 100$		30	A
Pulsed Collector Current <small>(Note 1)</small>		I_{CM}	120	A
Diode Continuous Forward Current	$T_C = 100$	I_F	30	A
Power Dissipation	$T_C = 25$	P_D	329	W
	$T_C = 100$		132	W
Operating Junction Temperature		T_J	-55 ~ 150	

Electrical Characteristics of the IGBT $T_C=25$, unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
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OFF

Collector Emitter Breakdown Voltage	BV_{CES}	$V_{GE} = 0V, I_C = 1mA$	1350	--	--	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE} = 1350V, V_{GE} = 0V$	--	--	1	mA
Gate Emitter Leakage Current	I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$	--	--	± 250	nA

ON

Gate Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{GE} = V_{CE}, I_C = 30mA$	4.5	6.0	7.0	V
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V, I_C = 30A, T_C = 25$	--	1.90	2.25	V
		$V_{GE} = 15V, I_C = 30A, T_C = 125$	--	2.20	--	V

DYNAMIC

Input Capacitance	C_{IES}	$V_{CE} = 30V,$ $V_{GE} = 0V$ $f = 1MHz$	--	3570	--	pF
Output Capacitance	C_{OES}		--	85	--	pF
Reverse Transfer Capacitance	C_{RES}		--	55	--	pF

SWITCHING (Note 2)

Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 30A$ $R_G = 5 \Omega, V_{GE} = 15V$ Inductive Load, $T_C = 25$	--	30	--	ns
Rise Time	t_r		--	35	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	145	--	ns
Fall Time	t_f		--	115	172	ns
Turn-On Switching Loss	E_{ON}		--	4.4	6.6	mJ
Turn-Off Switching Loss	E_{OFF}		--	1.18	1.77	mJ
Total Switching Loss	E_{TS}	--	5.56	8.37	mJ	
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 30A$ $R_G = 5 \Omega, V_{GE} = 15V$ Inductive Load, $T_C = 125$	--	30	--	ns
Rise Time	t_r		--	35	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	160	--	ns
Fall Time	t_f					

Electrical Characteristics of the DIODE $T_C=25$, unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit	
Diode Forward Voltage	V_{FM}	$I_F = 30A$	$T_C = 25$	--	2.25	2.75	V
			$T_C = 125$	--	2.53	--	
Reverse Recovery Time	t_{rr}	$I_F = 30A,$ $di/dt = 200A/\mu s$	$T_C = 25$	--	300	450	ns
			$T_C = 125$	--	360	--	
Reverse Recovery Current	I_{rr}	$I_F = 30A,$ $di/dt = 200A/\mu s$	$T_C = 25$	--	30	45	A
			$T_C = 125$	--	34	--	
Reverse Recovery Charge	Q_{rr}	$I_F = 30A,$ $di/dt = 200A/\mu s$	$T_C = 25$	--	4400	--	nC
			$T_C = 125$	--	6120	--	

IGBT Characteristics

Fig. 1 Output characteristics

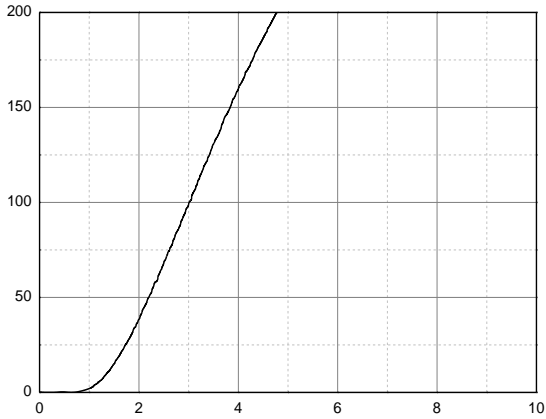


Fig. 2 Saturation voltage characteristics

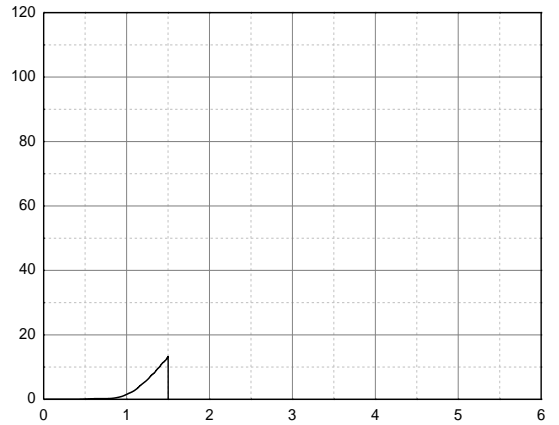


Fig. 3 Saturation voltage vs. collector current

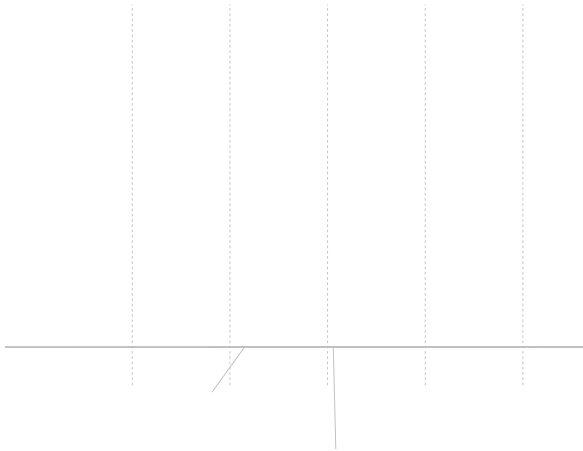


Fig. 4 Saturation voltage vs. gate bias

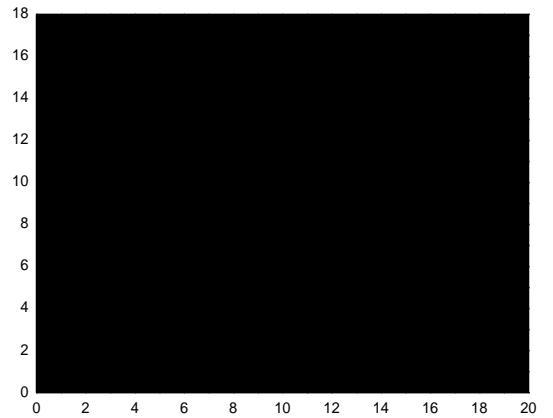


Fig. 5 Saturation voltage vs. gate bias

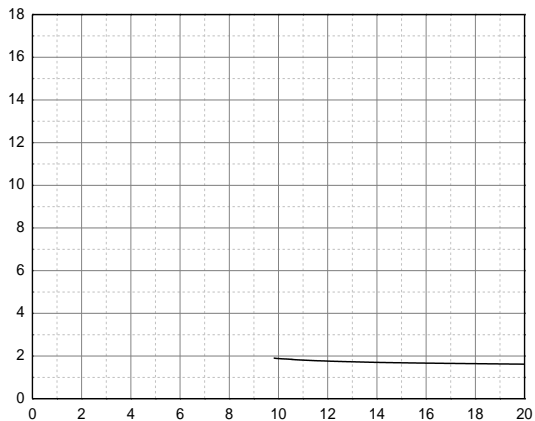
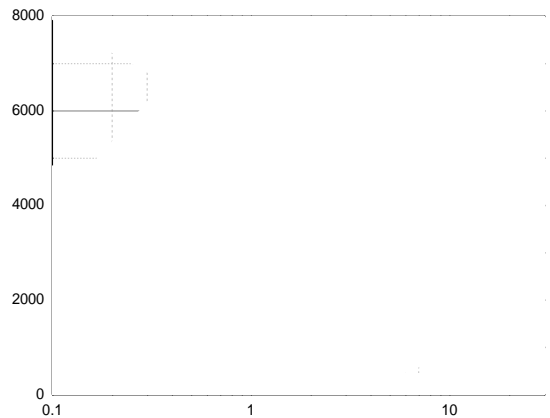


Fig. 6 Capacitance characteristics



IGBT Characteristics

Fig. 7 Turn-on time vs. gate resistor

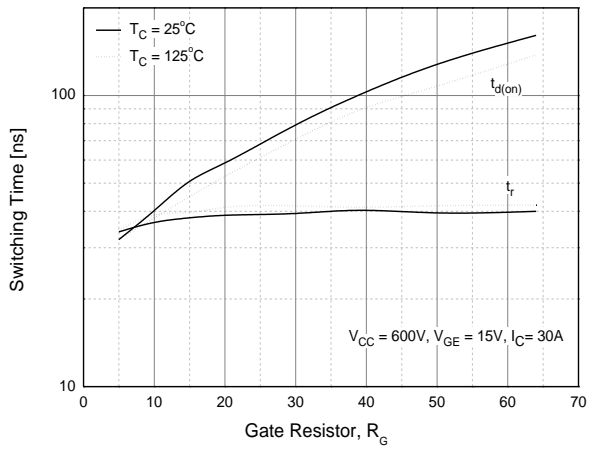


Fig. 8 Turn-off time vs. gate resistor

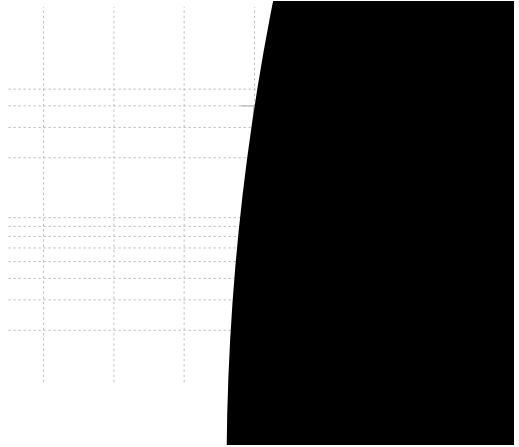


Fig. 9 Switching loss vs. gate resistor

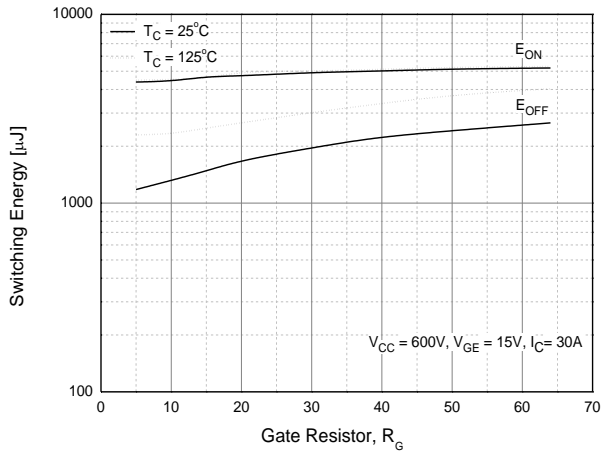


Fig. 10 Turn-on time vs. collector current

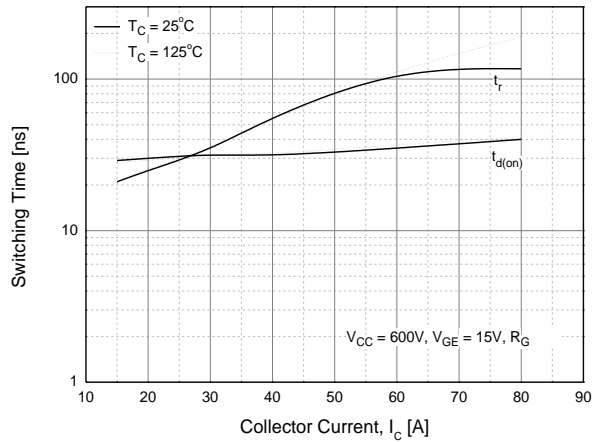


Fig. 11 Turn-off time vs. collector current

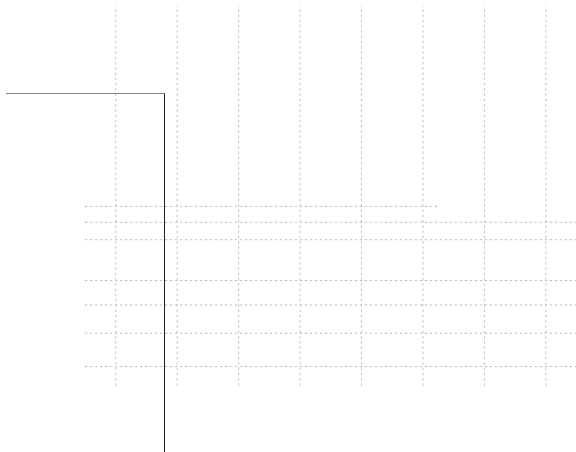


Fig. 12 Switching loss vs. collector current

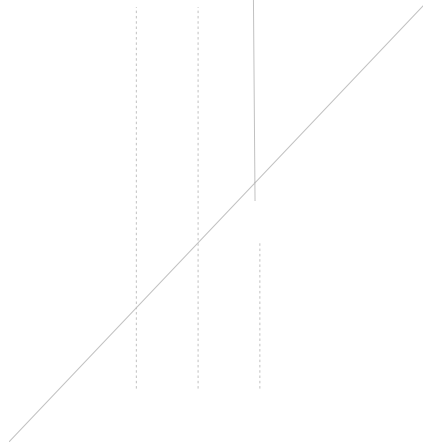


Fig. 13 Gate charge characteristics



Fig. 14 SOA

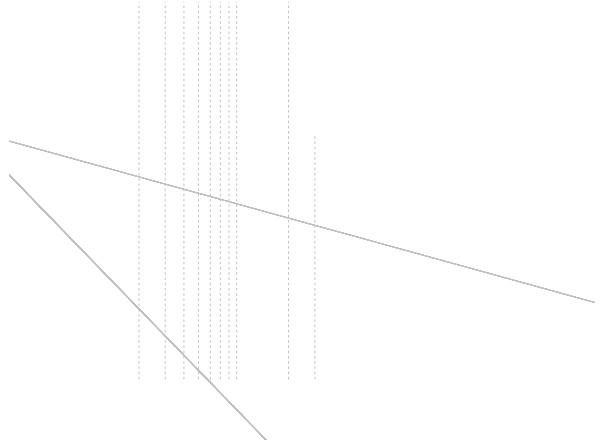


Fig. 15 RBSOA

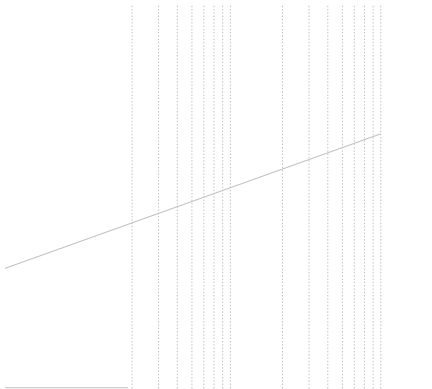


Fig. 16 Transient thermal impedance of IGBT

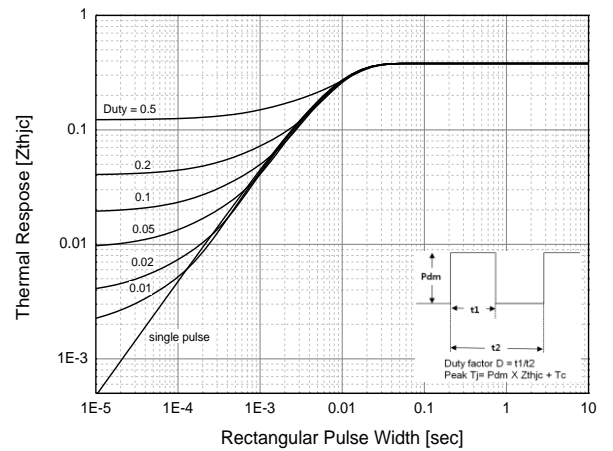
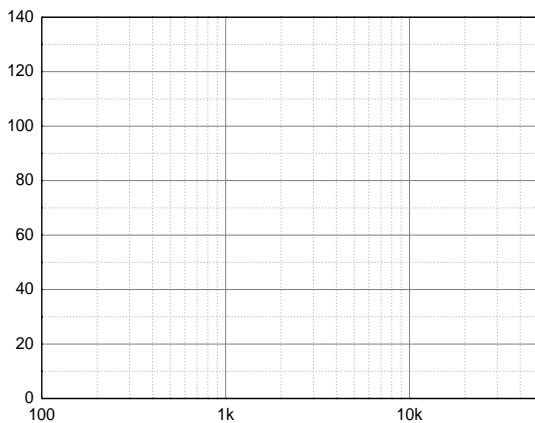


Fig. 17 Load Current vs. Frequency



Diode Characteristics

Fig. 18 Conduction characteristics



Fig. 19 Reverse recovery current vs. forward current

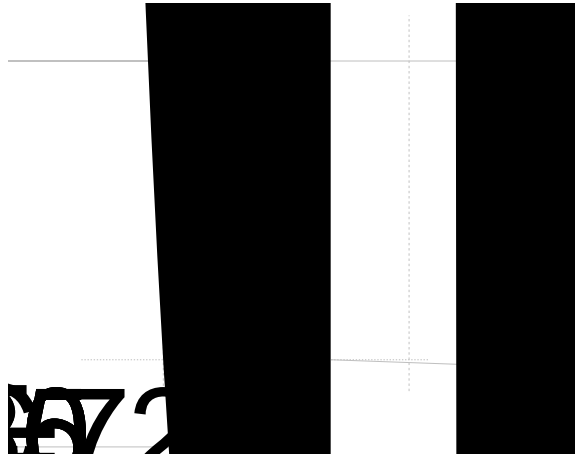


Fig. 20 Reverse recovery charge vs. forward current

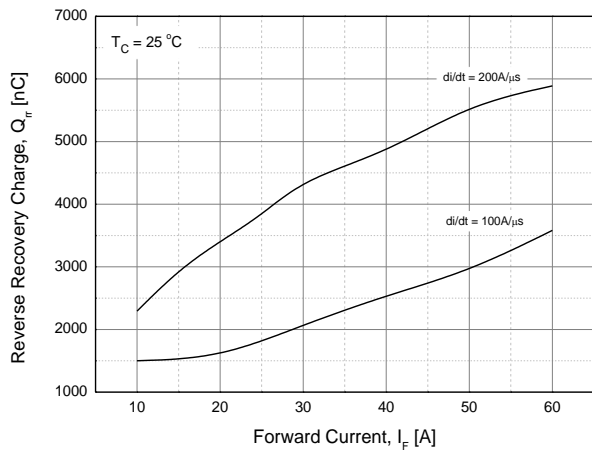
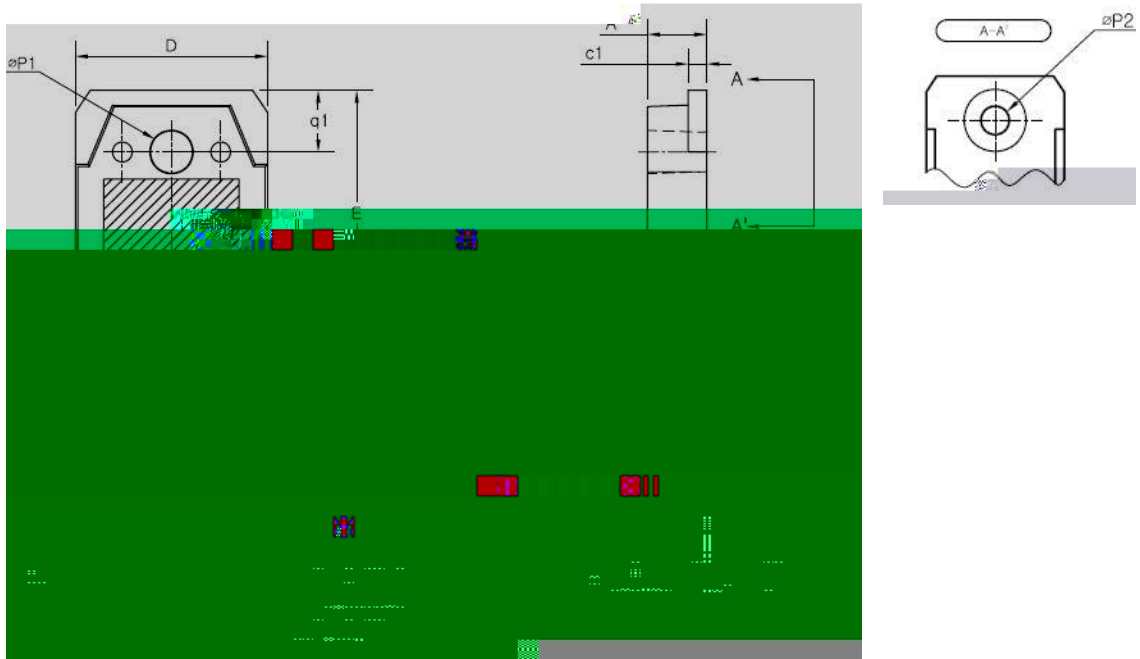


Fig. 21 Reverse recovery time vs. forward current



TO-3PN MECHANICAL DATA



SYMBOL	MIN	NOM	MAX
A	4.60	4.80	5.00
b	0.80	1.00	1.20
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
c	0.55	0.60	0.75
c1	1.45	1.50	1.65
D	15.40	15.60	15.80
E	19.70	19.90	20.10
e	5.15	5.45	5.75
L1	3.30	3.50	3.70
L2	19.80	20.00	20.20
øP1	3.30	3.40	3.50
øP2		(3.20)	
Q	2.20	2.40	2.60
q1	4.80	5.00	5.20

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