

Electrical Characteristics $T_{vj}=25^{\circ}\text{C}$, unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
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}	$V_{CE} = 0V, V_{GE} = 25V$	--	--	500	nA
Integrated Gate Resistor	$R_{G(int)}$	$f = 1MHz, \text{open Collector}$	--	21	--	
ON						
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{GE} = V_{CE}, I_C = 20mA$	4.0	6.0	8.0	V
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V, I_C = 20A, T_{vj} = 25$	--	1.75	2.15	V
		$V_{GE} = 15V, I_C = 20A, T_{vj} = 125$	--	2.04	--	V
		$V_{GE} = 15V, I_C = 20A, T_{vj} = 175$	--	2.23	--	V
Diode Forward Voltage	V_{FM}	$I_F = 20A, T_{vj} = 25$	--	2.25	--	V
		$I_F = 20A, T_{vj} = 125$	--	2.43	--	V
		$I_F = 20A, T_{vj} = 175$	--	2.53	--	V
DYNAMIC						
Input Capacitance	C_{IES}	$V_{CE} = 30V,$ $V_{GE} = 0V$ $f = 1MHz$	--	2036	--	pF
Output Capacitance	C_{OES}		--	42	--	pF
Reverse Transfer Capacitance	C_{RES}		--	30	--	pF
Total Gate Charge	Q_g	$V_{CC} = 600V, I_C = 20A$ $V_{GE} = 15V$	--	115	172	nC
Gate-Emitter Charge	Q_{ge}		--	17	25	nC
Gate-Collector Charge	Q_{gc}		--	46	69	nC

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
SWITCHING (Note 2)						
Turn-Off Delay Time	$t_{d(off)}$	$V_{CC} = 600V, I_C = 10A$ $R_G = R_{G(int)}, V_{GE} = 15V$ Inductive Load, $T_{vj} = 25$	--	142	--	ns
Fall Time	t_f		--	106	159	ns
Turn-Off Switching Loss	E_{OFF}		--	0.18	0.27	mJ
Turn-Off Delay Time	$t_{d(off)}$	$V_{CC} = 600V, I_C = 20A$ $R_G = R_{G(int)}, V_{GE} = 15V$ Inductive Load, $T_{vj} = 25$	--	142	--	ns
Fall Time	t_f		--	93	140	ns
Turn-Off Switching Loss	E_{OFF}		--	0.50	0.75	mJ
Turn-Off Delay Time	$t_{d(off)}$	$V_{CC} = 600V, I_C = 10A$ $R_G = R_{G(int)}, V_{GE} = 15V$ Inductive Load, $T_{vj} = 175$	--	173	--	ns
Fall Time	t_f		--	191	--	ns
Turn-Off Switching Loss	E_{OFF}		--	0.34	0.51	mJ
Turn-Off Delay Time	$t_{d(off)}$	$V_{CC} = 600V, I_C = 20A$ $R_G = R_{G(int)}, V_{GE} = 15V$ Inductive Load, $T_{vj} = 175$	--	169	--	ns
Fall Time	t_f		--	186	--	ns
Turn-Off Switching Loss	E_{OFF}		--	0.89	1.34	mJ

Notes :

(2) Not subject to production test verified by design/characterization

Device Characteristics

Figure 1. IGBT Output Characteristics

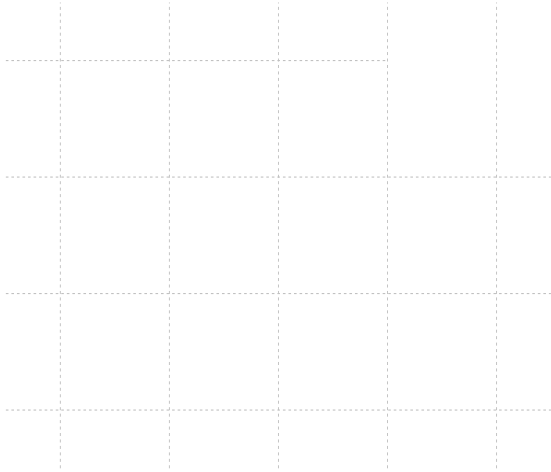


Figure 2. IGBT Output Characteristics



Figure 3. IGBT Saturation Voltage vs. Junction Temperature

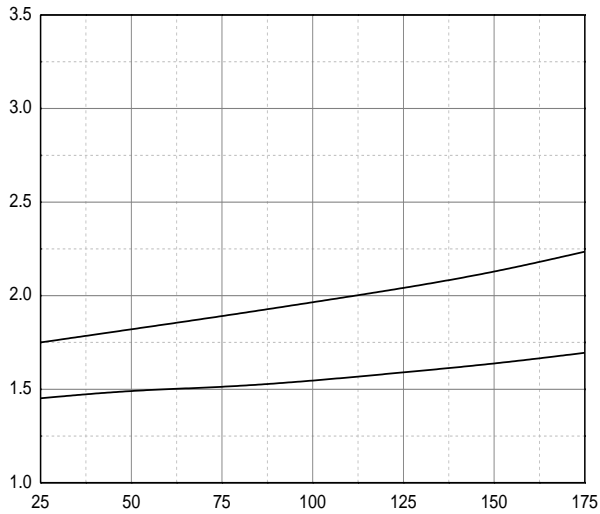
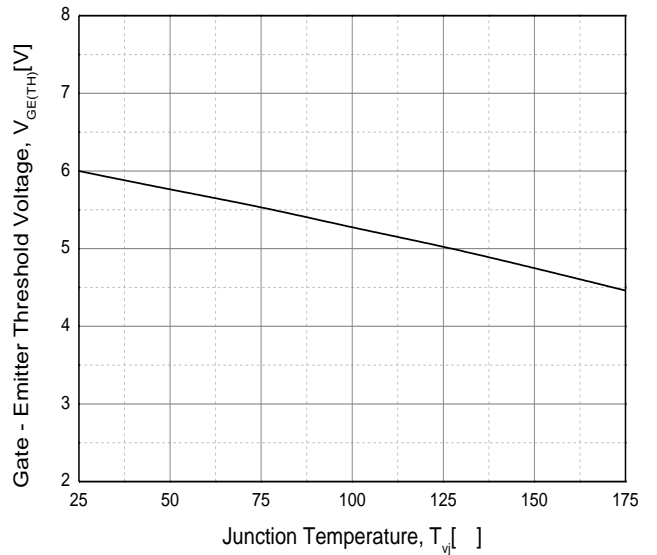


Figure 4. IGBT Threshold Voltage vs. Junction Temperature



Device Characteristics

Figure 5. IGBT Transfer Characteristics

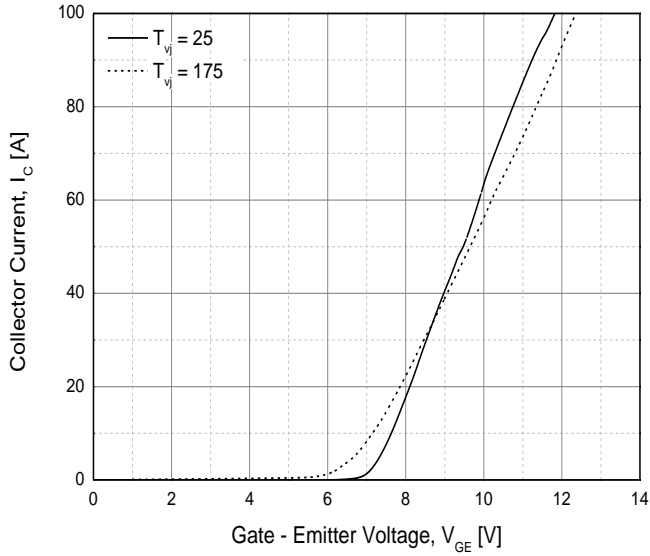


Figure 6. IGBT Capacitance Characteristics

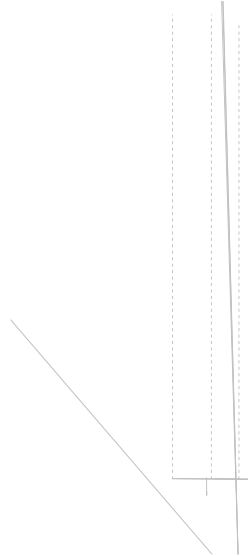


Figure 7. Diode Conduction Characteristics

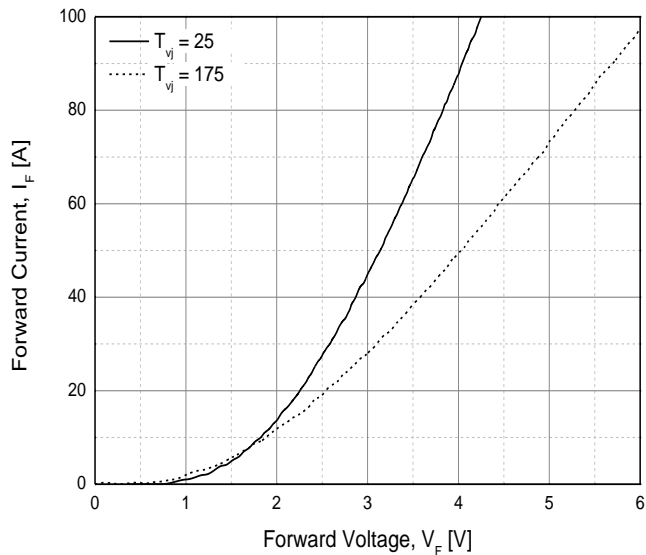
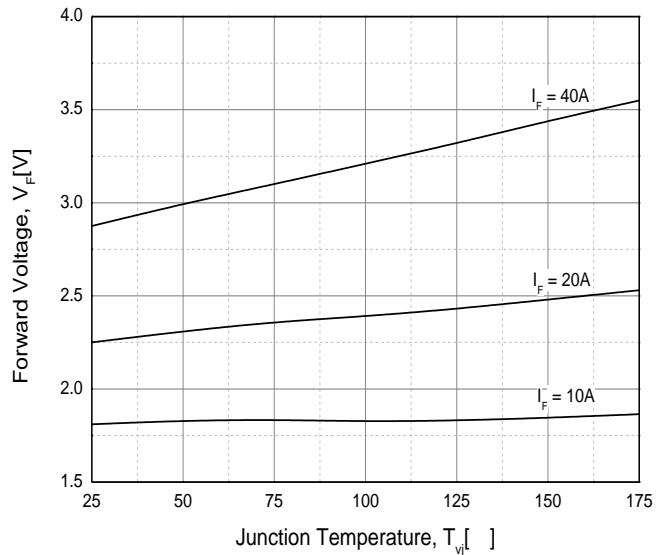


Figure 8. Diode Forward Voltage vs. Junction Temperature



Device Characteristics

Fig. 10 Turn-off Time vs. Gate Resistor

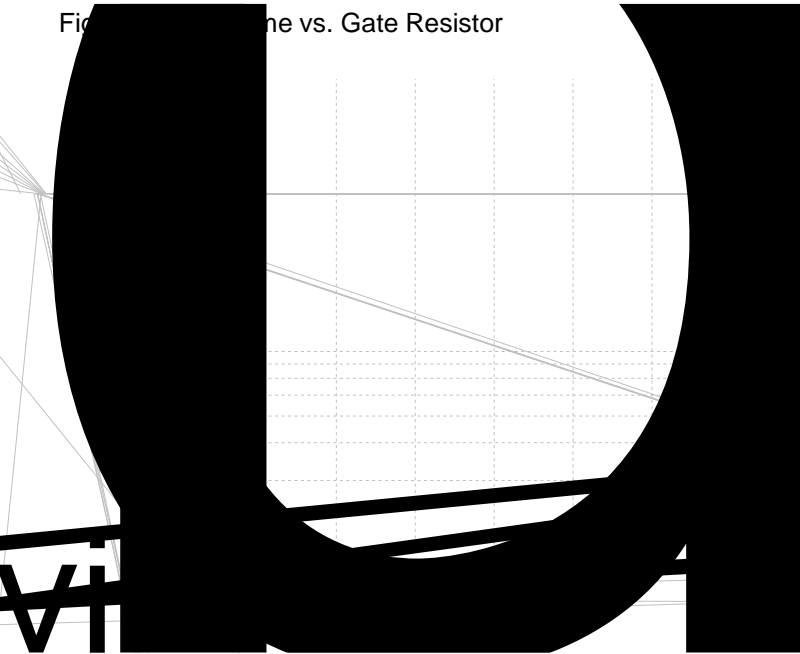


Fig. 10 Turn-off Time vs. Collector Current

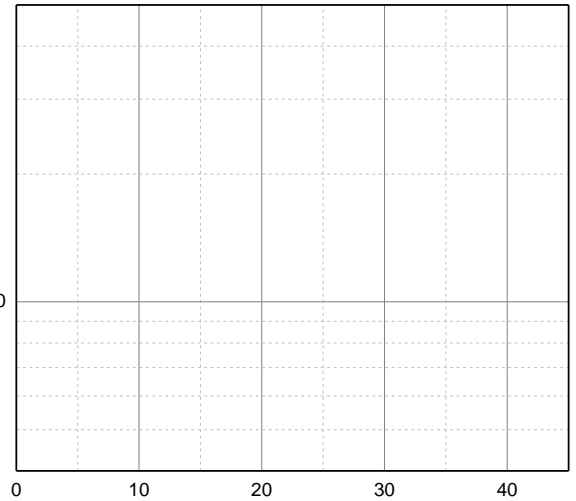


Fig. 11 Turn-off Loss vs. Gate Resistor

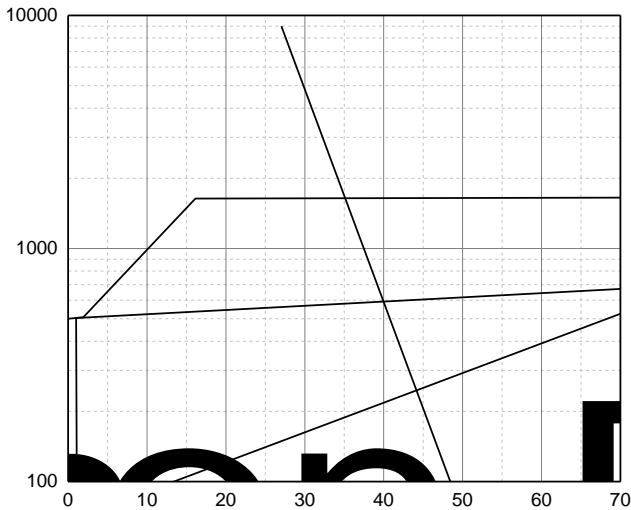
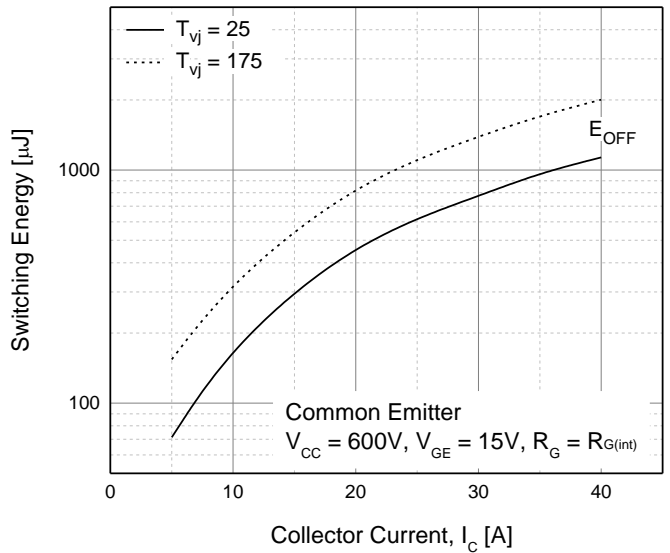


Fig. 12 Turn-off Loss vs. Collector Current



Device Characteristics

Figure 13. Gate Charge Characteristics

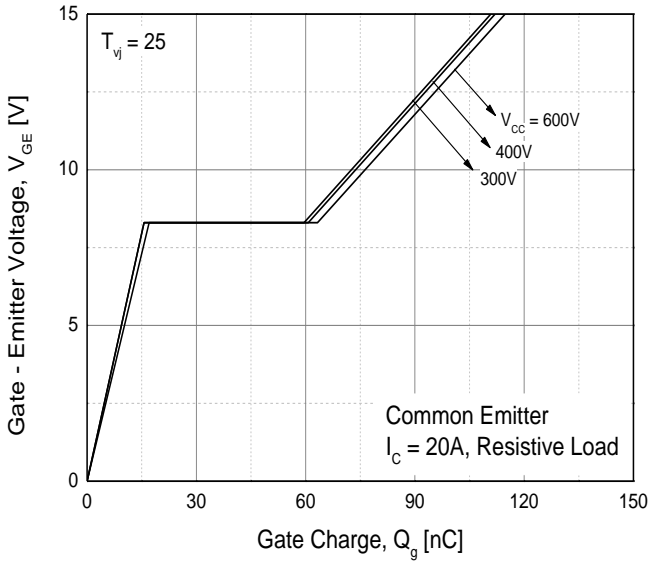


Figure 14. Transient Thermal Impedance

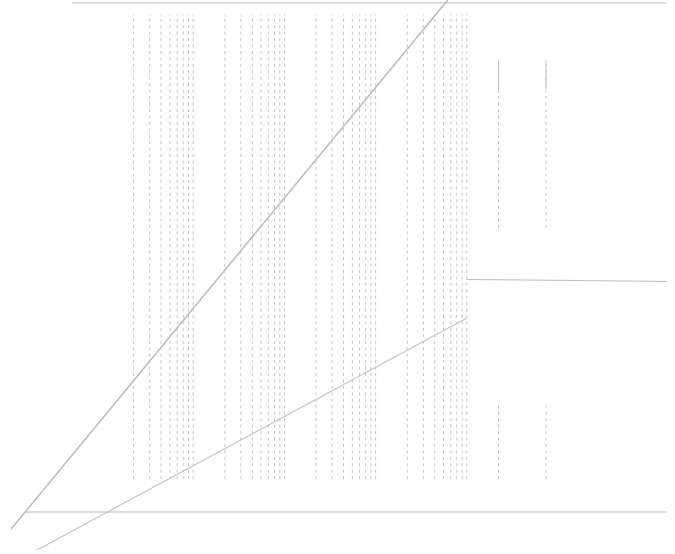


Figure 15. Power Dissipation vs. Case Temperature

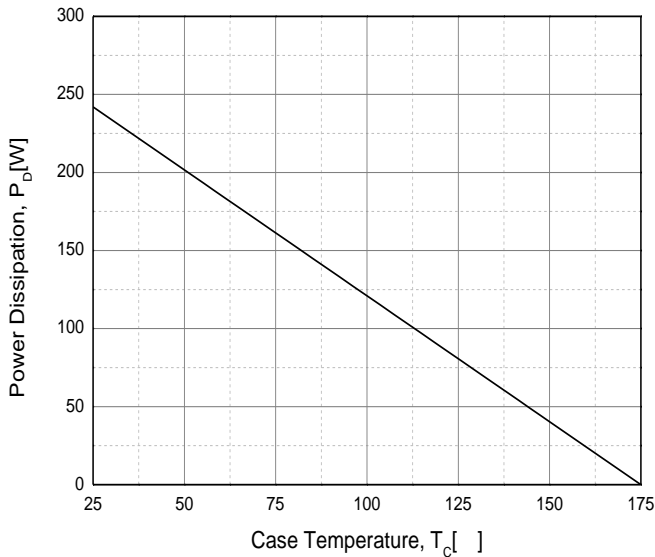
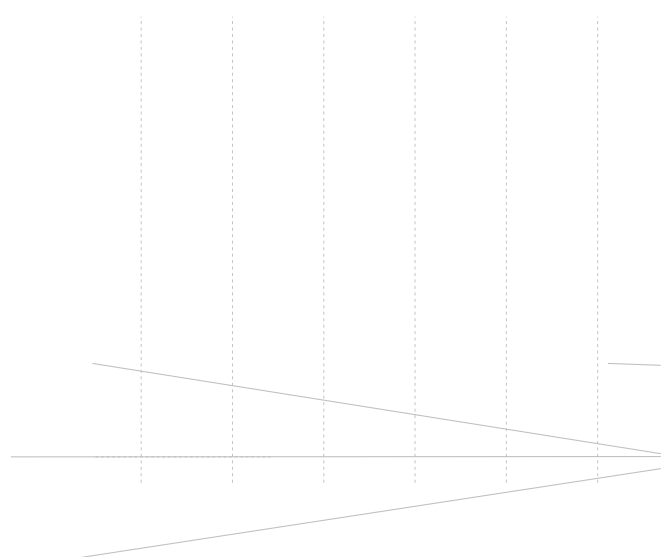


Figure 16. Collector Current vs. Case Temperature



Device Characteristics

Fig. 17 SOA

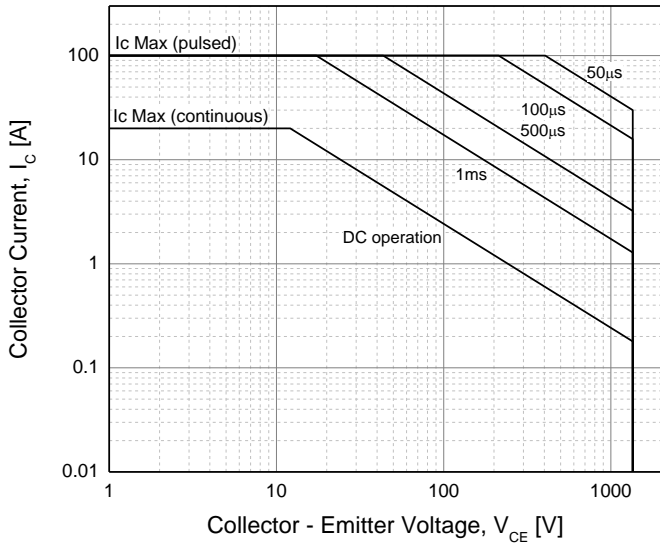


Fig. 18 RBSOA

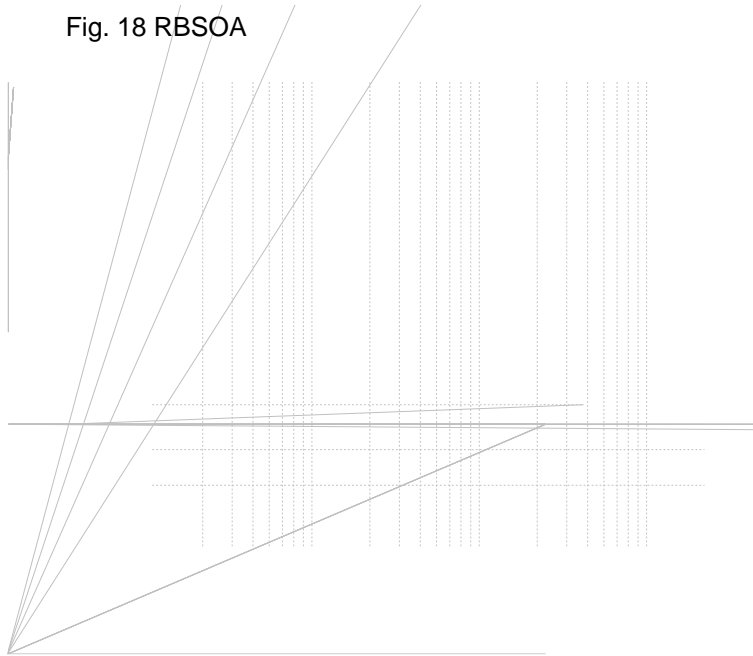


Fig. 19 Load Current vs. Frequency

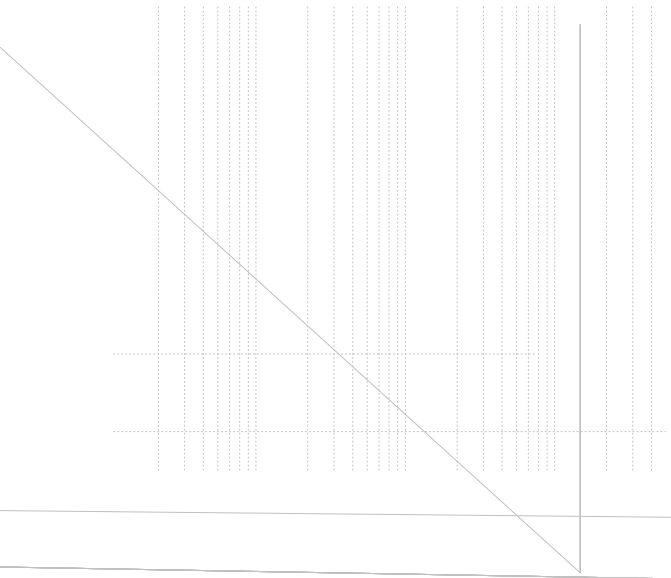
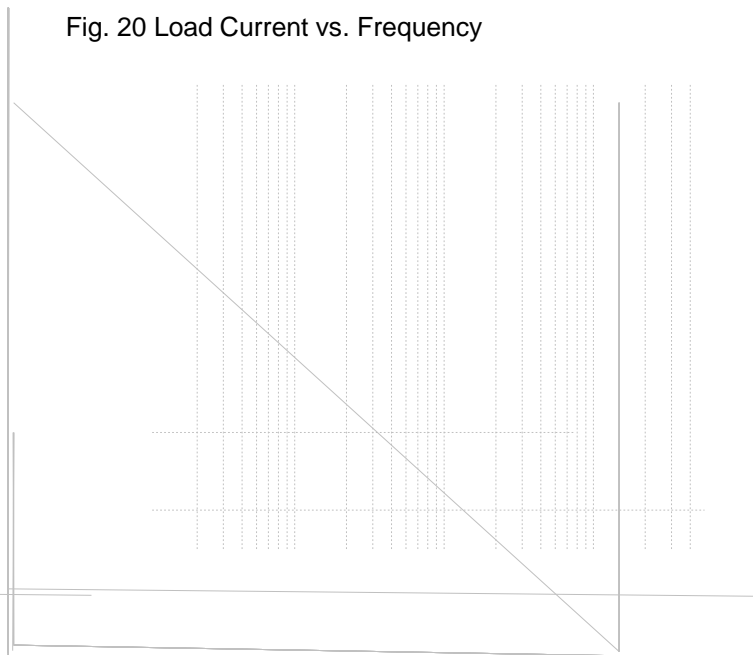
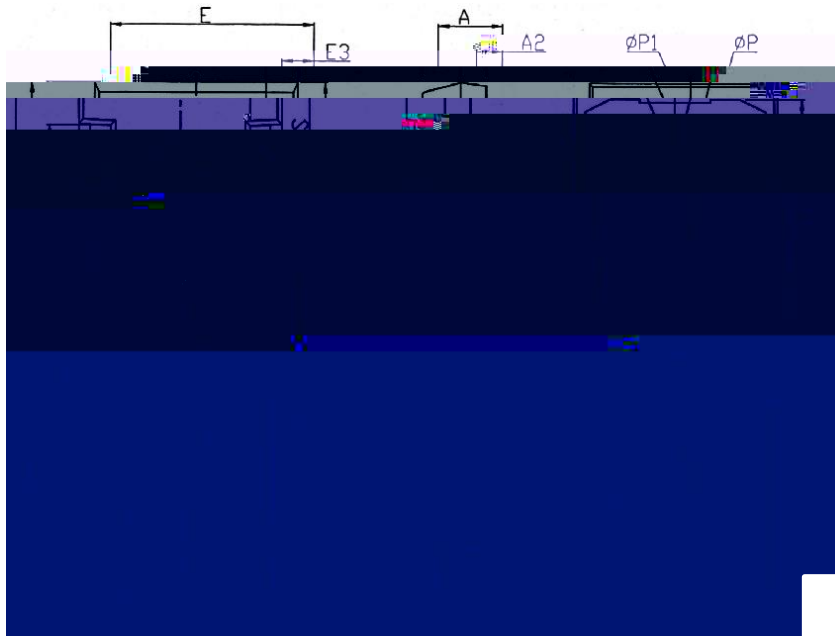


Fig. 20 Load Current vs. Frequency



TO-247 MECHANICAL DATA



SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.80	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
P	3.40	3.60	3.80
P1	-	-	7.30
S	6.15BSC		

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