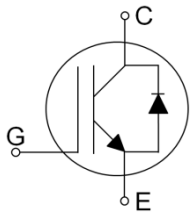
TGH30N60F2DR
Field Stop Trench IGBT



Applications
UPS, Welder, Inverter, Solar

Device	Package	Marking	Remark
TGH30N60F2DR	TO-247	TGH30N60F2DR	RoHS

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Collector-Emitter Voltage		V_{CES}	600	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 (Note 1)		I_{CM}	90	A
Diode Continuous Forward Current	T_C = 100	I_F	30	A
Diode Pulsed Current (Note 2)		I_{FM}	90	A
Power Dissipation	T_C = 25	P_D	278	W
	T_C = 100		139	W
Operating Junction Temperature		T_{vj}	-55 ~ 175	
Storage Temperature Range		T_{STG}	-55 ~ 150	
Maximum lead temperature for soldering purposes,		T_L	300	

Thermal Characteristics

Parameter	Symbol	Value	Unit
Maximum Thermal resistance, Junction-to-Case	R_{JC} (IGBT)	0.54	/W
Maximum Thermal resistance, Junction-to-Case	R_{JC} (DIODE)	1.43	/W
Maximum Thermal resistance, Junction-to-Ambient	R_{JA}	40	/W

Electrical Characteristics of the IGBT T_{vj}=25℃, unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF						
Collector Emitter Breakdown Voltage	BV_{CES}	V_{GE} = 0V, I_C = 1mA	600	--	--	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE} = 600V, V_{GE} = 0V	--	--	1	mA
Gate Emitter Leakage Current	I_{GES}	V_{CE} = 0V, V_{GE} = 20V	--	--	250	nA
Integrated Gate Resistance	$R_{G(int)}$	f = 1MHz, Open Collector	--	3.7	--	
ON						
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	V_{GE} = V_{CE}, I_C = 30mA	4.5	6.0	7.5	V
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$	V_{GE} = 15V, I_C = 30A, T_{vj} = 25	--	1.45	1.95	V
		V_{GE} = 15V, I_C = 30A, T_{vj} = 125	--	1.59	--	V
		V_{GE} = 15V, I_C = 30A, T_{vj} = 175	--	1.70	--	V
DYNAMIC						
Input Capacitance	C_{IES}	V_{CE} = 30V V_{GE} = 0V f = 1MHz	--	2000	--	pF
Output Capacitance	C_{OES}		--	135	--	pF
Reverse Transfer Capacitance	C_{RES}		--	80	--	pF
Total Gate Charge	Q_g	V_{CC} = 400V, I_C = 30A V_{GE} = 15V	--	135	202	nC
Gate-Emitter Charge	Q_{ge}		--	12	18	nC
Gate-Collector Charge	Q_{gc}		--	73	110	nC
SWITCHING (Note 3)						
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 15A R_G = 5 , V_{GE} = 15V Inductive Load, T_{vj} = 25	--	20	--	ns
Rise Time	t_r		--	14	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	98	--	ns
Fall Time	t_f		--	68	--	ns
Turn-On Switching Loss	E_{ON}		--	0.33	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.26	--	mJ
Total Switching Loss	E_{TS}		--	0.59	--	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 30A R_G = 5 , V_{GE} = 15V Inductive Load, T_{vj} = 25	--	23	--	ns
Rise Time	t_r		--	28	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	91	--	ns
Fall Time	t_f		--	38	--	ns
Turn-On Switching Loss	E_{ON}		--	0.74	1.11	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.45	0.68	mJ
Total Switching Loss	E_{TS}		--	1.19	1.79	mJ

Electrical Characteristics of the IGBT T_{vj}=25℃, unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
SWITCHING (Note 3)						
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 15A R_G = 5 , V_{GE} = 15V Inductive Load, T_{vj} = 175	--	21	--	ns
Rise Time	t_r		--	15	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	112	--	ns
Fall Time	t_f		--	156	--	ns
Turn-On Switching Loss	E_{ON}		--	0.65	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.54	--	mJ
Total Switching Loss	E_{TS}		--	1.19	--	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 30A R_G = 5 , V_{GE} = 15V Inductive Load, T_{vj} = 175	--	24	--	ns
Rise Time	t_r		--	26	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	100	--	ns
Fall Time	t_f		--	135	--	ns
Turn-On Switching Loss	E_{ON}		--	1.27	1.91	mJ
Turn-Off Switching Loss	E_{OFF}		--	0.86	1.29	mJ
Total Switching Loss	E_{TS}		--	2.13	3.20	mJ
Short Circuit Withstanding Time	t_{SC}	V_{CC} = 300V, V_{GE} = 15V, T_{vj} = 125℃	5	--	--	s

Notes :
(3) Not subject to production test verified by design/characterization

Electrical Characteristics of the DIODE T_{vj}=25℃, unless otherwise noted

Parameter	Symbol	SymbolTest condition	Min.	Typ.	Max.	Unit
Diode Forward V8047 0 540 720 reW*nBT/F2 9 Tf1 0 0 1 28.41 361 Tm0 g0 G[(V8047 0 540 720 reW*20 reW*nBT/F1 9 Tf1 0 0						

IGBT Characteristics

Fig. 1 IGBT Output Characteristics

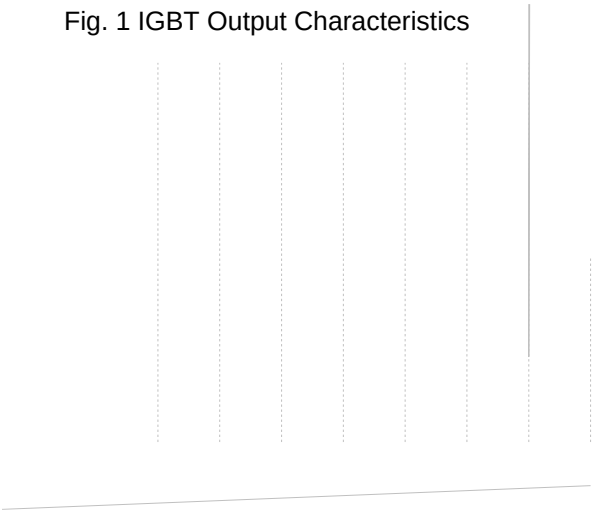


Fig. 2 IGBT Output Characteristics

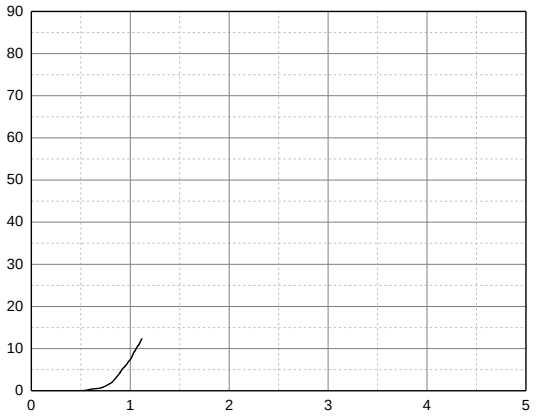


Fig. 3 IGBT Saturation Voltage vs. Junction Temperature

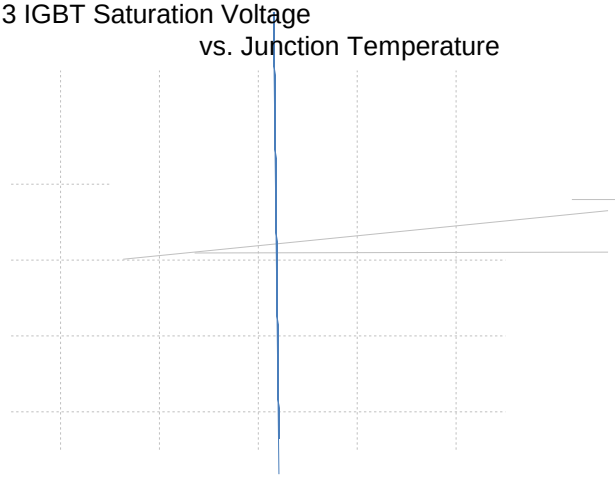


Fig. 4 IGBT Saturation Voltage vs. Gate Bias

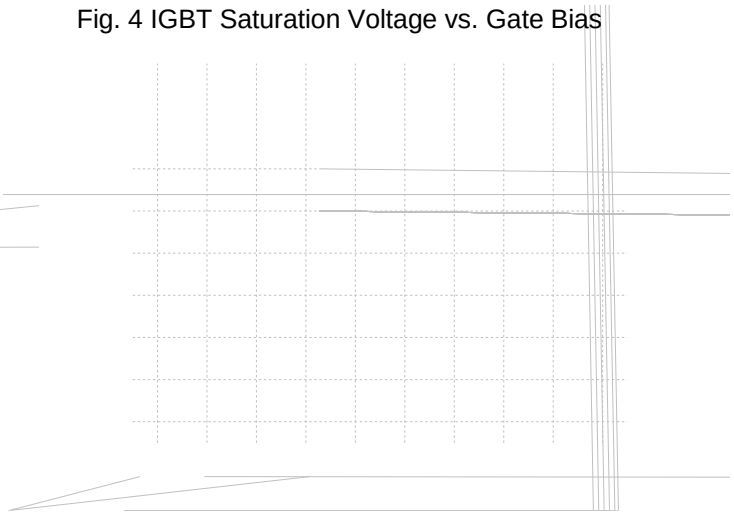


Fig. 5 IGBT Saturation Voltage vs. Gate Bias

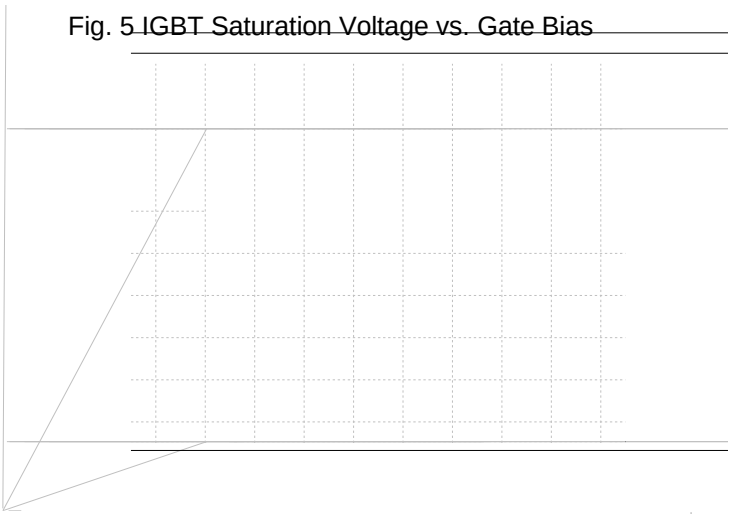
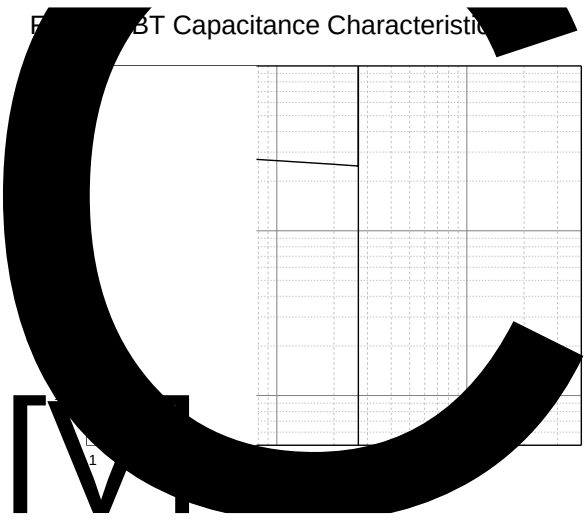


Fig. IGBT Capacitance Characteristi



IGBT Characteristics

Fig. 7 Turn-on Time vs. Gate Resistor

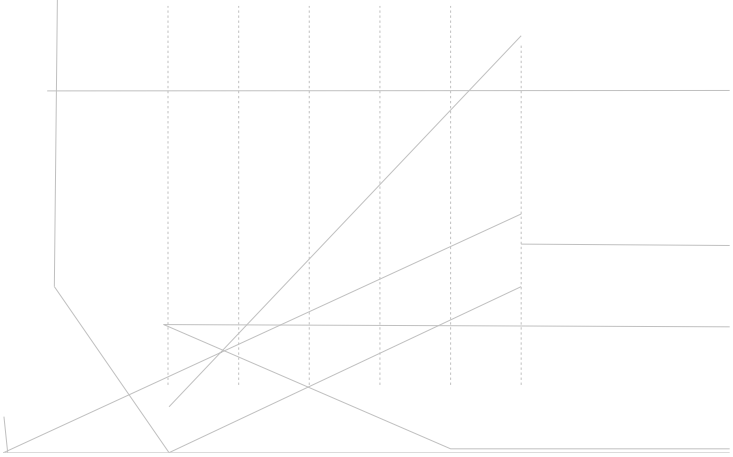


Fig. 8 Turn-off Time vs. Gate Resistor

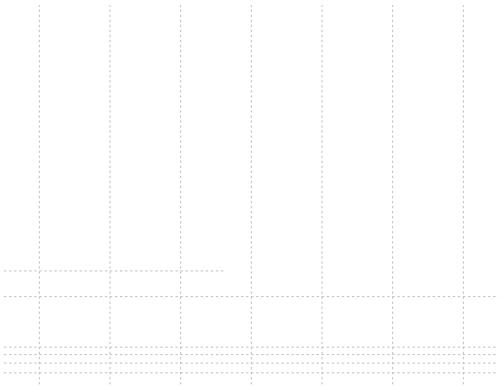


Fig. 9 Switching Loss vs. Gate Resistor

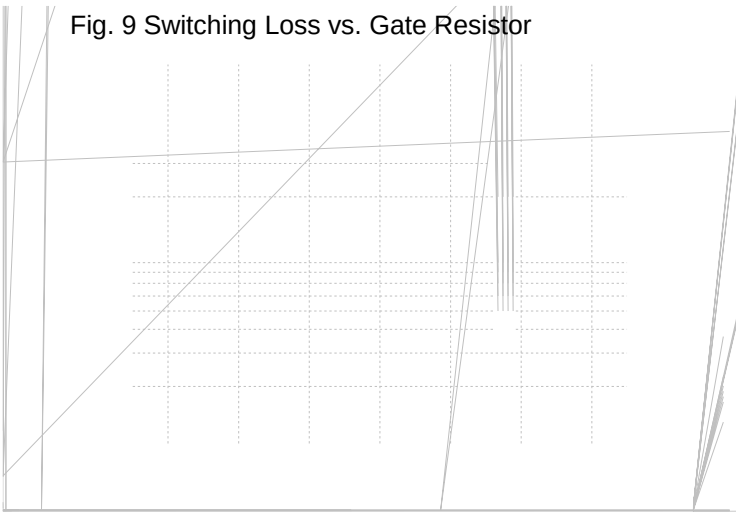


Fig. 10 Turn-on Time vs. Collector Current

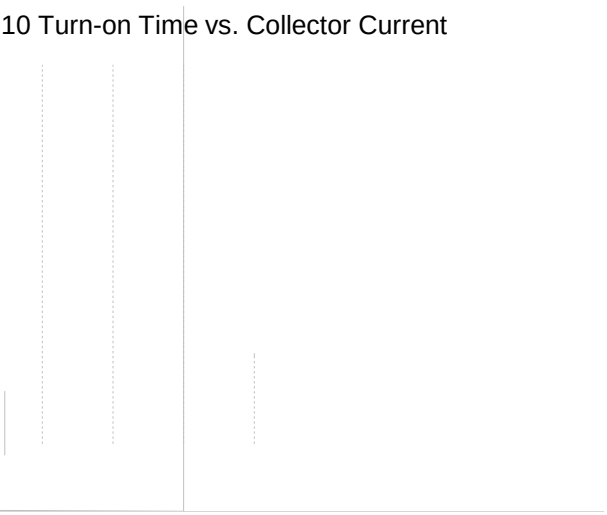


Fig. 11 Turn-off Time vs. Collector Current

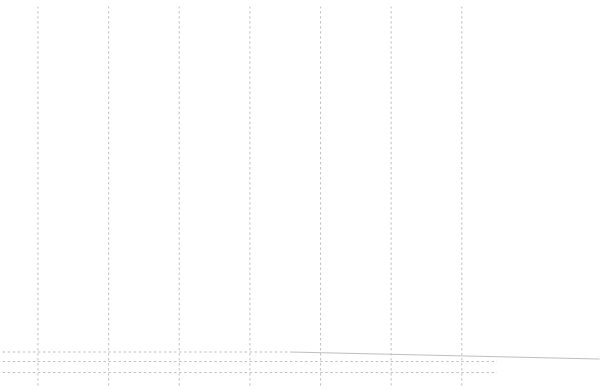
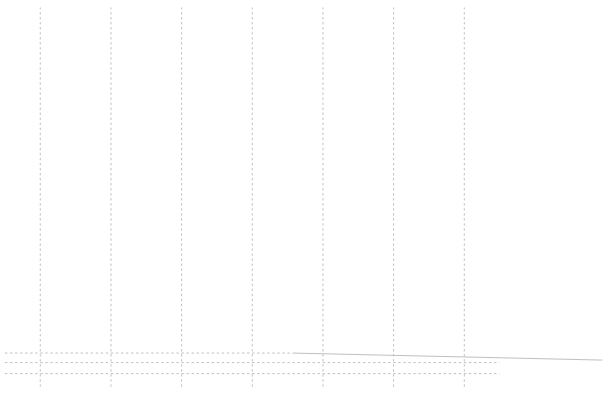


Fig. 12 Switching Loss vs. Collector Current



IGBT Characteristics

Fig. 13 Gate Charge Characteristics

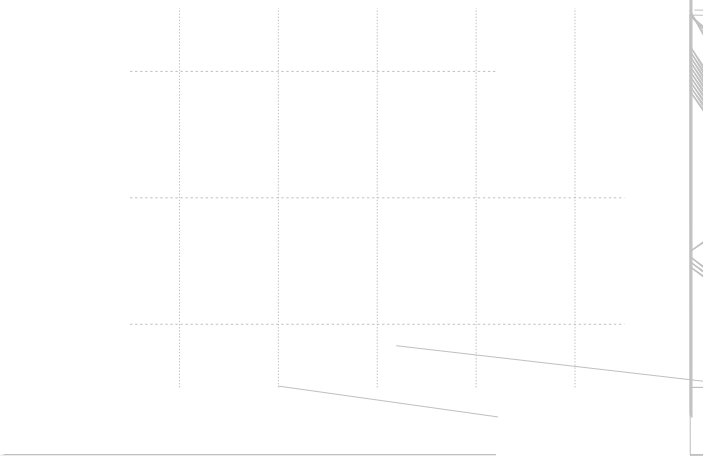


Fig. 14 SOA

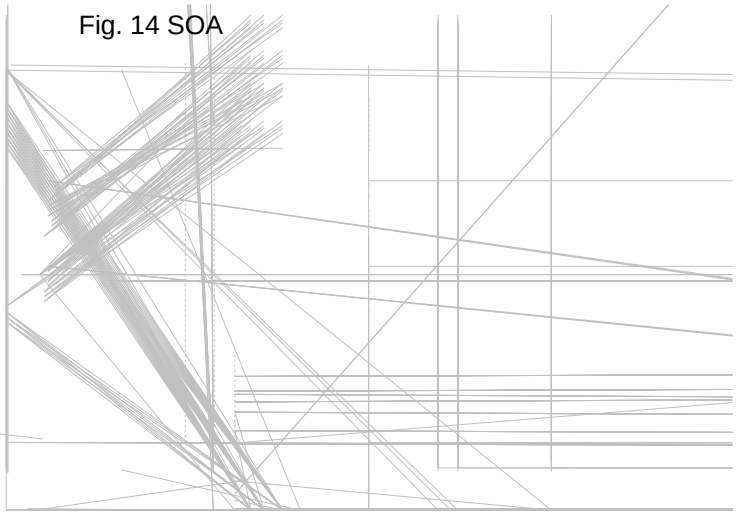


Fig. 15 RBSOA

Fig. 16 Transient Thermal Impedance of IGBT

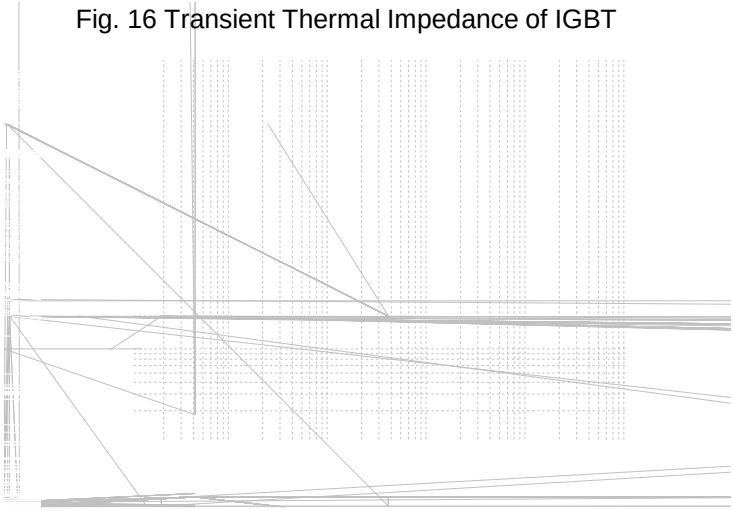
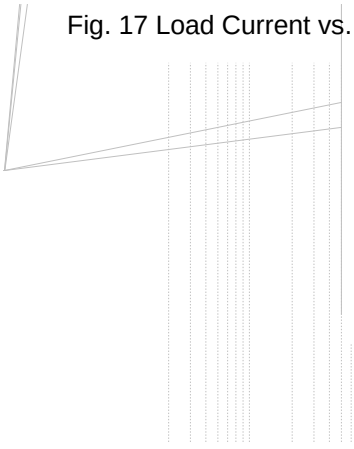


Fig. 17 Load Current vs. Frequency



Diode Characteristics

Fig. 18 Diode Conduction Characteristics

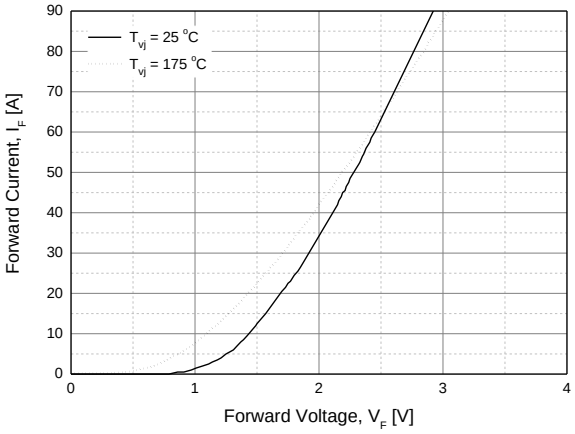


Fig. 19 Reverse Recovery Current vs. Forward Current

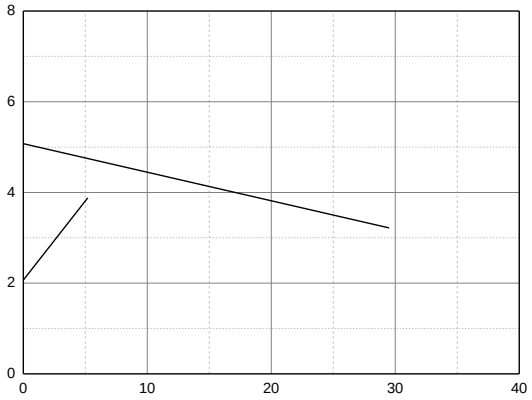


Fig. 20 Reverse Recovery Charge vs. Forward Current

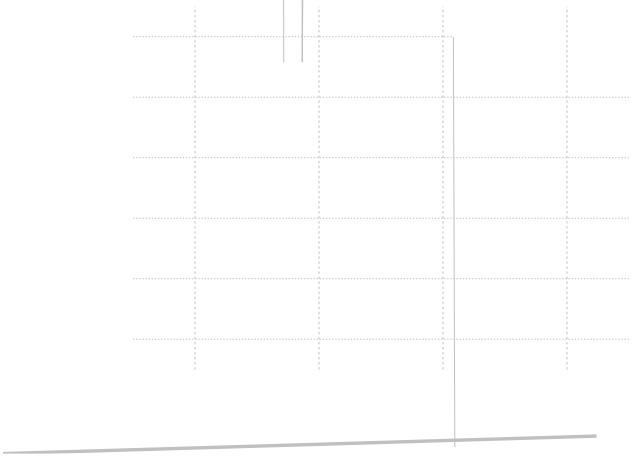
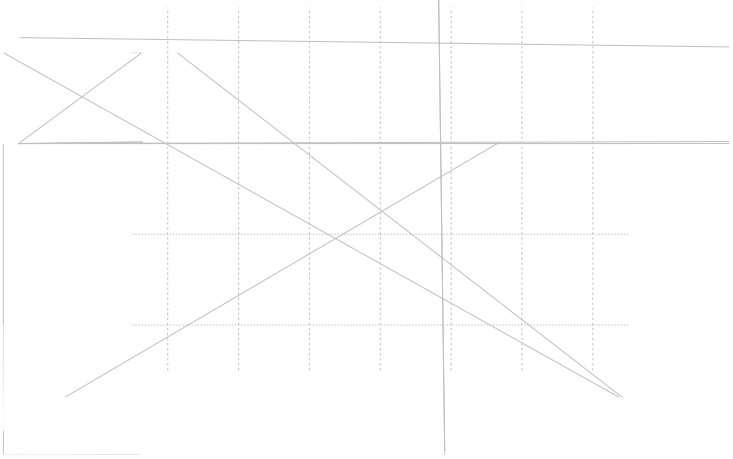
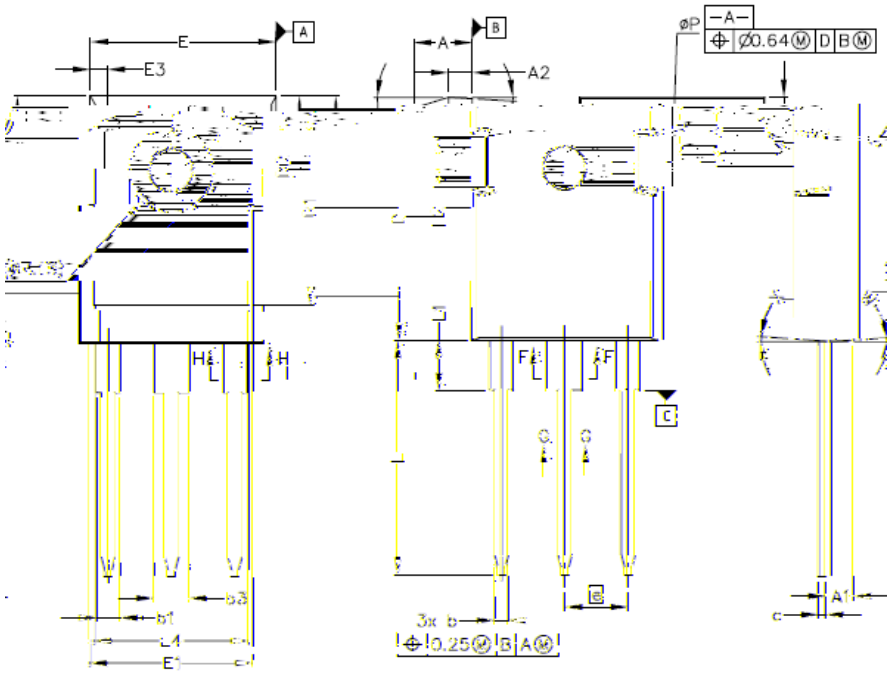
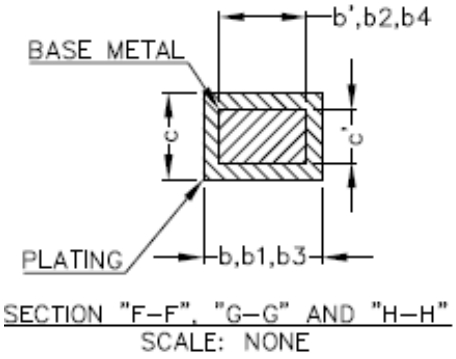


Fig. 21 Reverse Recovery Time vs. Forward Current



TO-247 MECHANICAL DATA





SYM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	.190	.205
A1	2.29	2.54	.090	.100
A2	1.91	2.16	.075	.085
b'	1.07	1.28	.042	.050
b	1.07	1.33	.042	.052
b1	1.91	2.41	.075	.095
b2	1.91	2.16	.075	.085
b3	2.87	3.38	.113	.133
b4	2.87	3.13	.113	.123
c'	0.55	0.65	.022	.026
c	0.55	0.68	.022	.027
D	20.80	21.10	.819	.831
D1	16.25	17.65	.640	.695
D2	0.95	1.25	.037	.049
E	15.75	16.13	.620	.635
E1	13.10	14.15	.516	.557
E2	3.68	5.10	.145	.201
E3	1.00	1.90	.039	.075
E4	12.38	13.43	.487	.529
e	5.44 BSC		.214 BSC	
N	3		3	
L	19.81	20.32	.780	.800
L1	4.10	4.40	.161	.173
øP	3.51	3.65	.138	.144
Q	5.49	6.00	.216	.236
S	6.04	6.30	.238	.248
T	17.5° REF.			
W	3.5° REF.			
X	4° REF.			

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