



GP2000FSS06S

POWERLINE N-CANNEL IGBT MODULE

APPLICATIONS

- High Power Switching.
- Motor Control.
- UPS.
- AC And DC Servo Drive Amplifiers.

FEATURES

- n - Channel.
- Enhancement Mode.
- High Input Impedance.
- High Switching Speed.
- Latch-Free Operation.
- Low Forward Voltage Drop.
- Isolated Base.
- Short Circuit Capability (10 μ s).

CIRCUIT

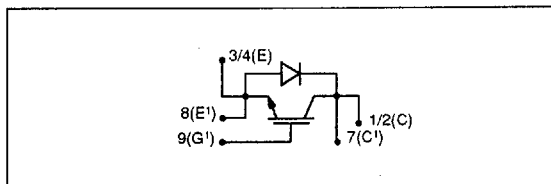


Fig.1 Single switch circuit diagram

TYPICAL KEY PARAMETERS

V_{CES}	600V
$V_{CE(sat)}$	2.1V
$I_C(Cont)$	2000A
$I_C(PK)$	4000A
t_r	290ns
t_f	430ns

PACKAGE OUTLINE

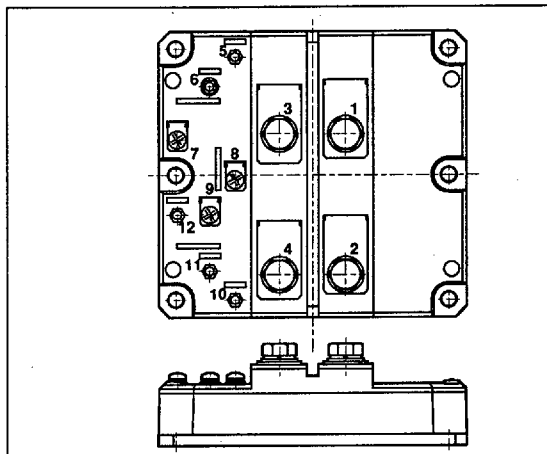


Fig.2

Outline type code: F. See package details for further information.

RATINGS

$T_{case} = 25^{\circ}C$ unless stated otherwise.				
Symbol	Parameter	Test Conditions	Max.	Units
V_{CES}	Collector-emitter voltage	$V_{GE} = 0V$	600	V
V_{GES}	Gate-emitter voltage	-	± 20	V
I_C	Collector current	DC, $T_{case} = 75^{\circ}C$	2000	A
$I_{C(PK)}$		1ms, $T_{case} = 75^{\circ}C$	4000	A
P_{max}	Maximum power dissipation		10000	W
V_{isol}	Isolation voltage	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	2500	V

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{\theta(j-c)}$	Thermal resistance	DC junction to case	-	0.0125	°C/W
$R_{\theta(c-h)}$	Thermal resistance - Case to heatsink	Mounting torque 5Nm (with mounting grease)	-	0.002	°C/W
T_j	Junction temperature	-	-	150	°C
T_{stg}	Storage temperature range	-	-40	150	°C
-	Screw torque (mounting)	-	-	6.0	Nm

DC ELECTRICAL CHARACTERISTICS

$T_{case} = 25^\circ\text{C}$ unless stated otherwise.						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_{CES}	Collector cut-off current	$V_{GE} = 0V, V_{CE} = V_{CES}$	-	-	16	mA
I_{GES}	Gate leakage current	$V_{GE} = \pm 20V, V_{CE} = 0V$	-	-	± 8	μA
$V_{GE(TH)}$	Gate threshold voltage	$I_C = 80\text{mA}, V_{GE} = V_{CE}$	4	-	7.5	V
$V_{CE(SAT)}$	Collector-emitter saturation voltage	$V_{GE} = 15V, I_C = 2000A$	-	2.1	2.8	V
		$V_{GE} = 15V, I_C = 2000A, T_{case} = 125^\circ\text{C}$	-	2.3	3.0	V

DIODE DC CHARACTERISTICS

$T_{case} = 25^\circ\text{C}$ unless stated otherwise.						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_F	Diode forward current	DC, $T_{case} = 75^\circ\text{C}$	-	-	1200	A
I_{FM}	Diode maximum forward current	$T_{case} = 75^\circ\text{C}, t_p = 1\text{ms}$	-	-	4000	A
V_F	Diode forward voltage	$I_F = 2000A$	-	1.7	2.2	V
$R_{\theta(j-c)}$	Thermal resistance	DC junction to case	-	-	0.043	°C/W

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
C_{ies}	Input capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1\text{MHz}$	-	232000	-	pF
C_{oss}	Output capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1\text{MHz}$	-	35200	-	pF
C_{res}	Reverse transfer capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1\text{MHz}$	-	33600	-	pF

INDUCTIVE SWITCHING CHARACTERISTICS

For definition of switching waveforms, refer to figures 6 and 7 shown in application note AN4504 IGBT Ratings and Characteristics.

$T_{\text{case}} = 125^{\circ}\text{C}$ unless stated otherwise.						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$t_{d(\text{off})}$	Turn-off delay time	$I_C = 2000\text{A},$ $V_{GE} = \pm 15\text{V},$ $V_{CE} = 50\% V_{CES},$ $R_{G(\text{ON})} = R_{G(\text{OFF})} = 0.4\Omega$	-	560	-	ns
t_f	Fall time		-	430	-	ns
E_{OFF}	Turn-off energy loss		-	184	-	mJ
$t_{d(\text{on})}$	Turn-on delay time		-	810	-	ns
t_r	Rise time		-	290	-	ns
E_{ON}	Turn-on energy loss		-	144	-	mJ

DIODE DYNAMIC CHARACTERISTICS (INDUCTIVE)

$T_{\text{case}} = 125^{\circ}\text{C}$ unless stated otherwise.						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
t_{rr}	Reverse recovery time	$T_{\text{case}} = 25^{\circ}\text{C}, I_F = 2000\text{A}$ $V_R = 50\% V_{CES}, di_F/dt = 3200\text{A}/\mu\text{s}$	-	90	-	ns
Q_{rr}	Reverse recovery charge		-	8	-	μC
t_{rr}	Reverse recovery time	$I_F = 2000\text{A}$ $V_R = 50\% V_{CES}, di_F/dt = 3200\text{A}/\mu\text{s}$	-	228	-	ns
Q_{rr}	Reverse recovery charge		-	43	-	μC

CURVES

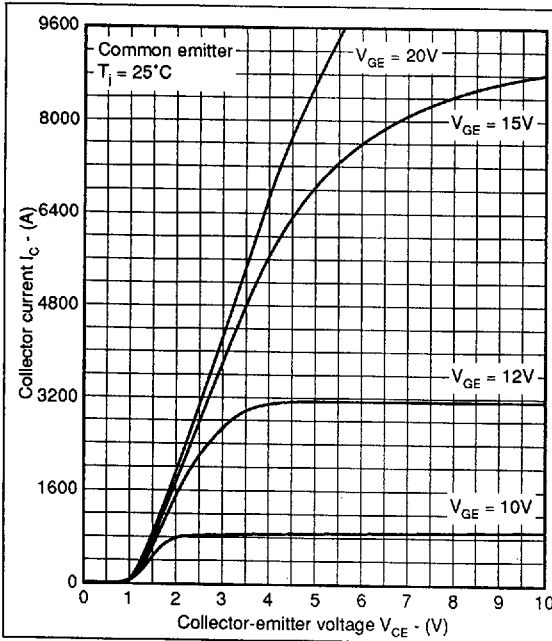


Fig.3 Typical output characteristics @ 25°C

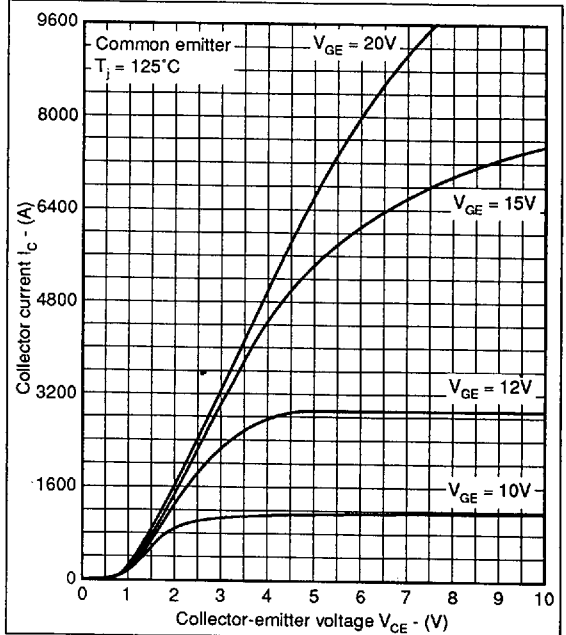


Fig.4 Typical output characteristics @ 125°C

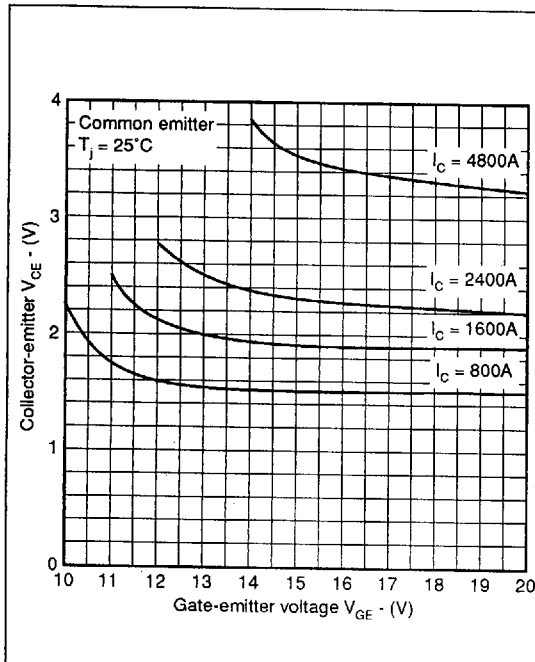


Fig.5 Typical transfer characteristics @ 25°C

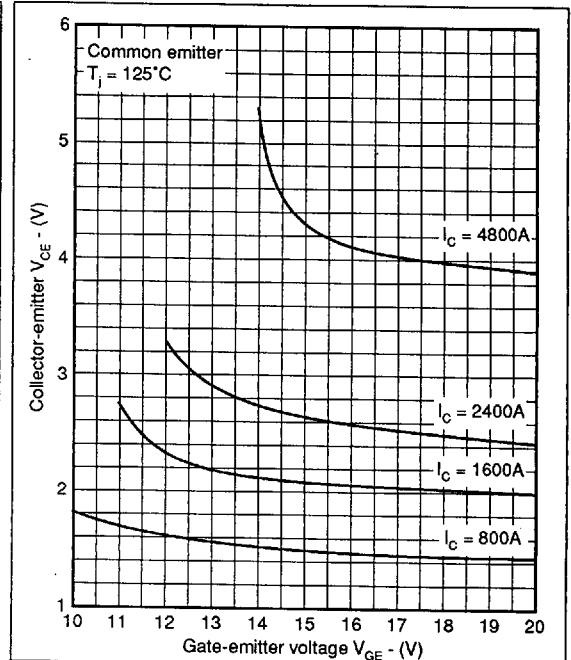


Fig.6 Typical transfer characteristics @ 125°C

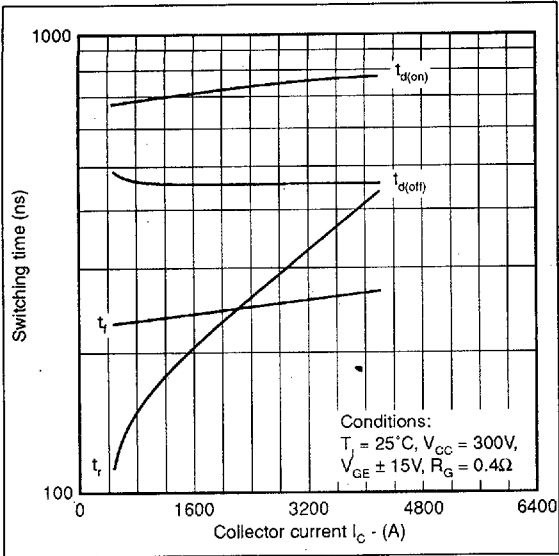


Fig.7 Typical switching time vs I_C @ 25°C

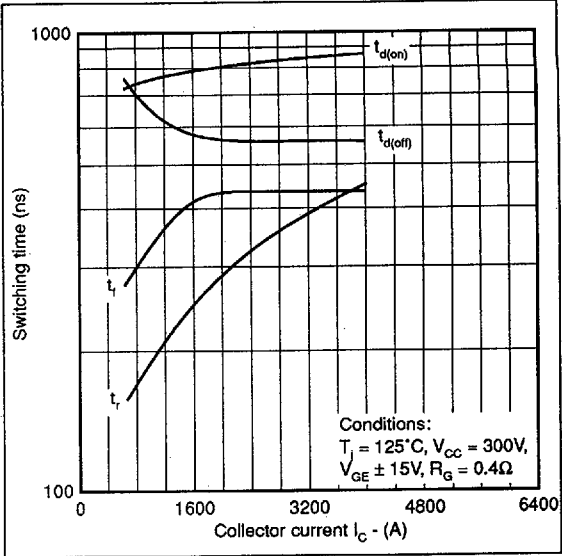


Fig.8 Typical switching time vs I_C @ 125°C

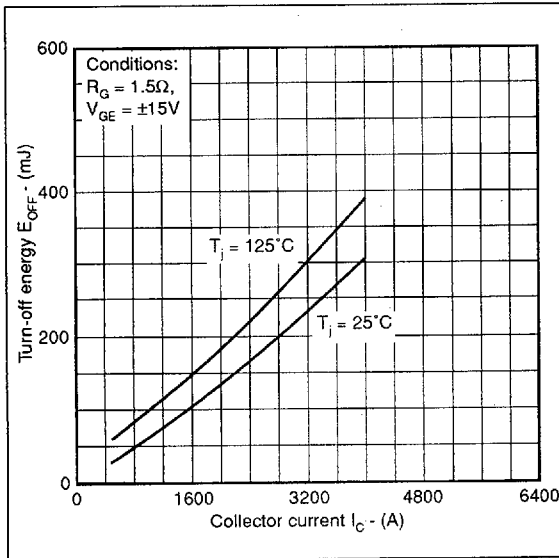


Fig.9 Typical turn-off losses

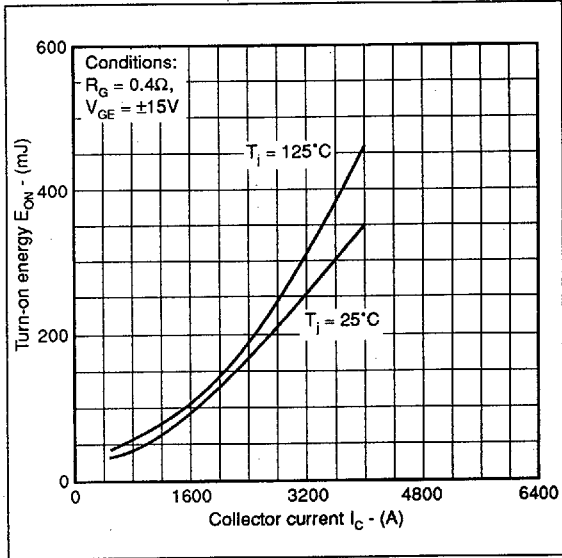


Fig.10 Typical turn-on losses

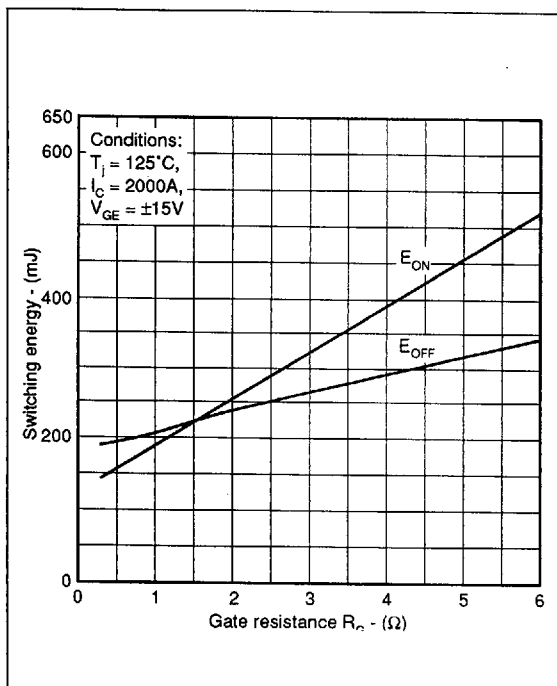


Fig. 11 Typical switching energy @ 125°C

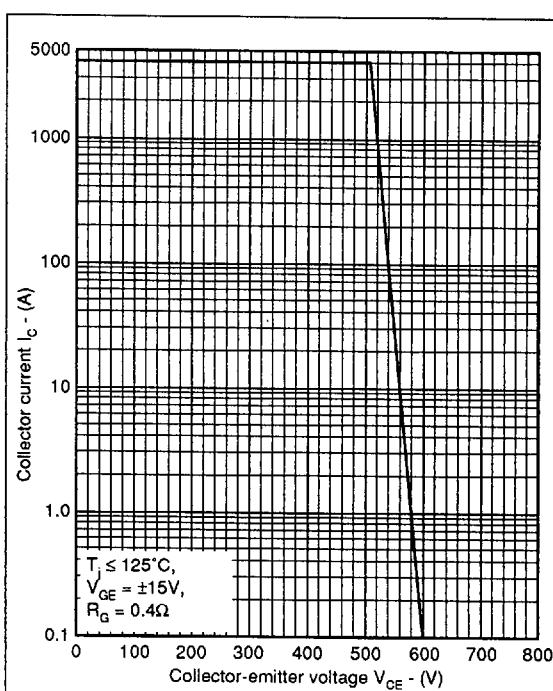


Fig. 12 Reverse bias safe operating area

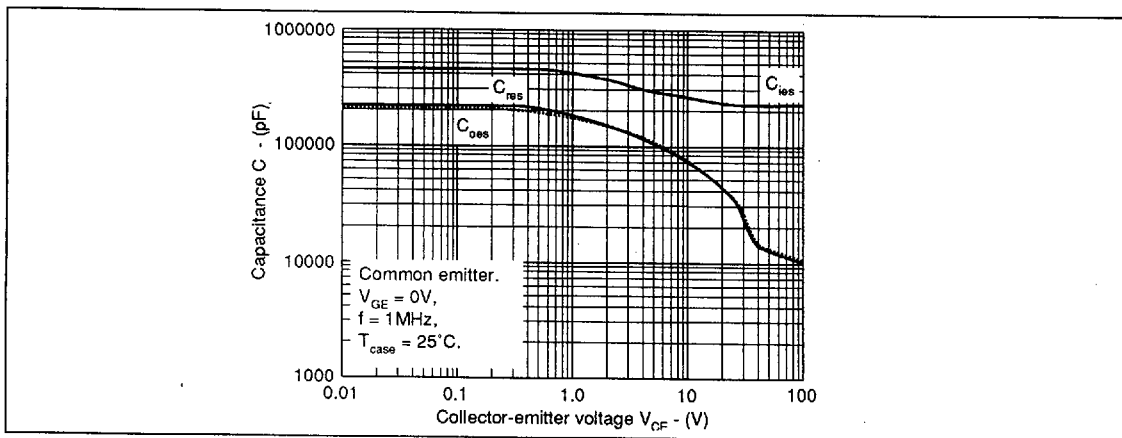


Fig. 13 Typical capacitance

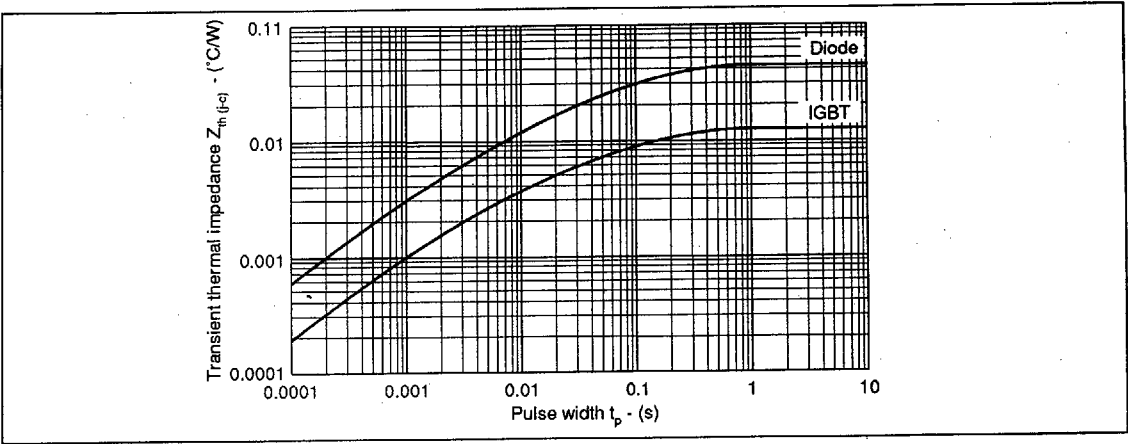


Fig.14 Transient thermal impedance

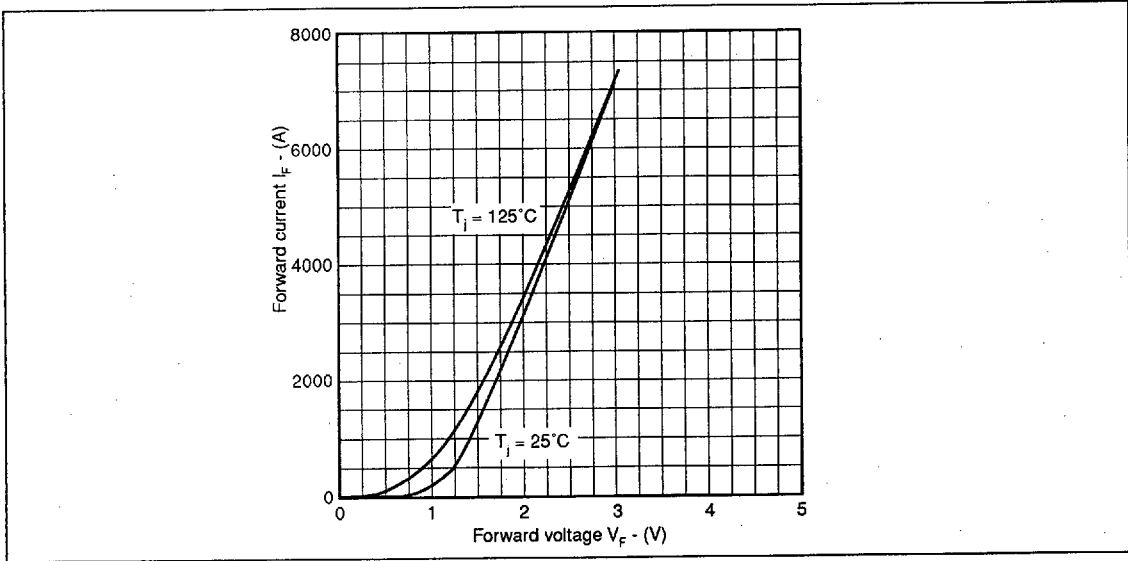
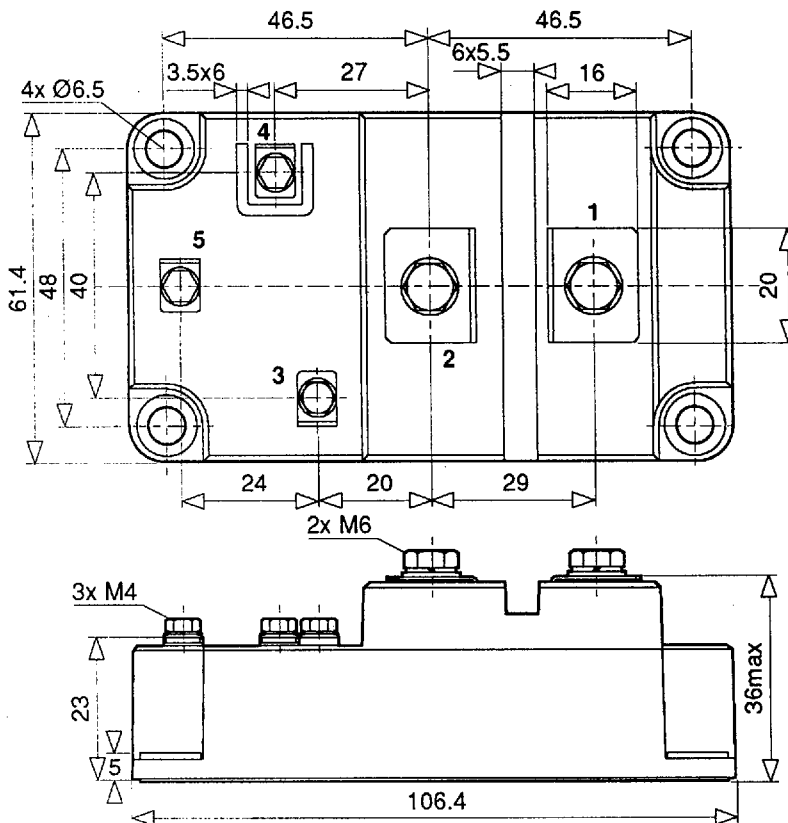
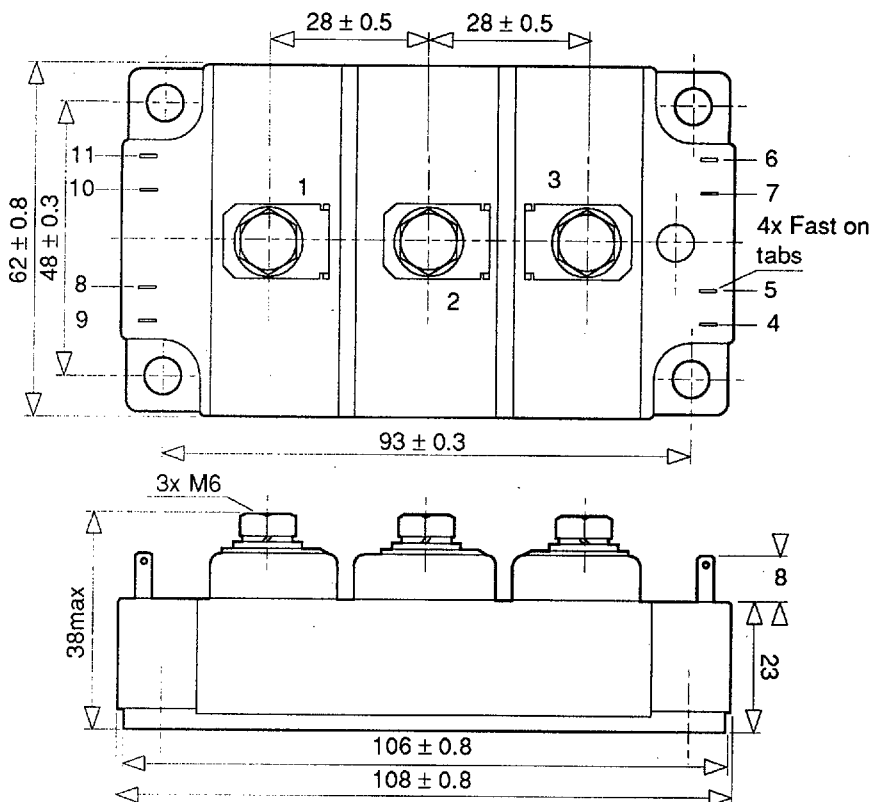


Fig.15 Typical diode forward characteristics



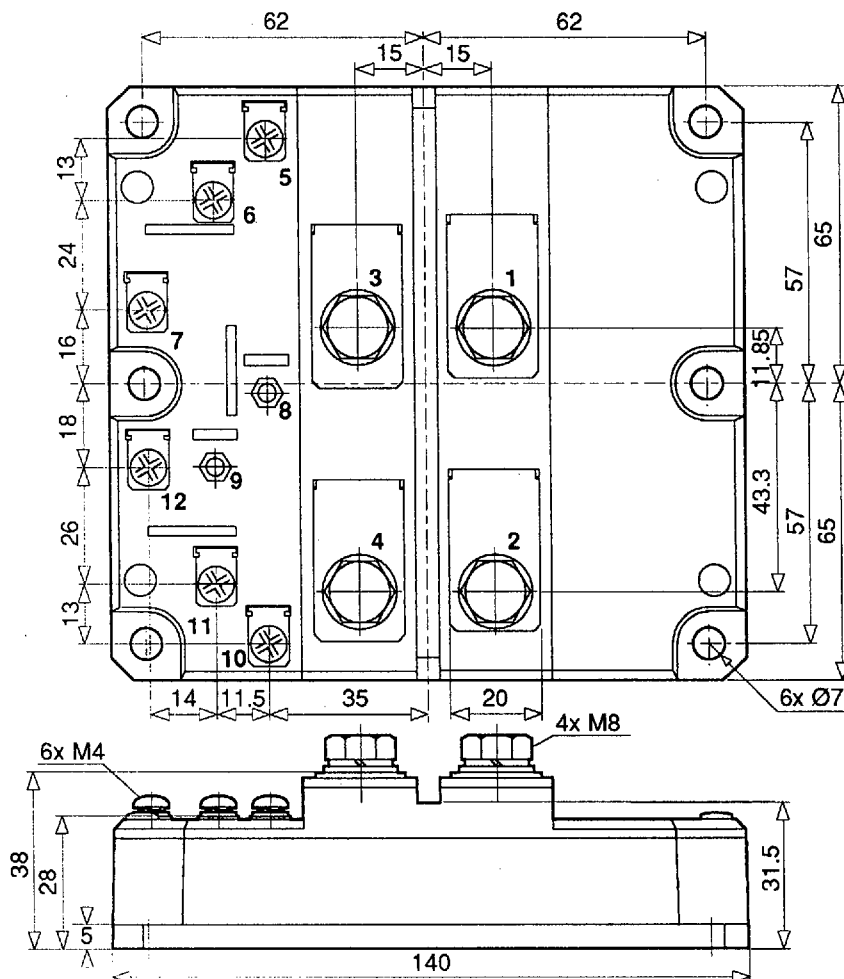
PACKAGE OUTLINE - L

Recommended fixings for mounting:	M6
Recommended mounting torque:	5Nm (44lbs.ins)
Recommended torque for electrical connections (M6):	5Nm (44lbs.ins)
Max. torque for electrical connections (M4):	2Nm (18lbs.ins)
Nominal weight:	265g



PACKAGE OUTLINE - M

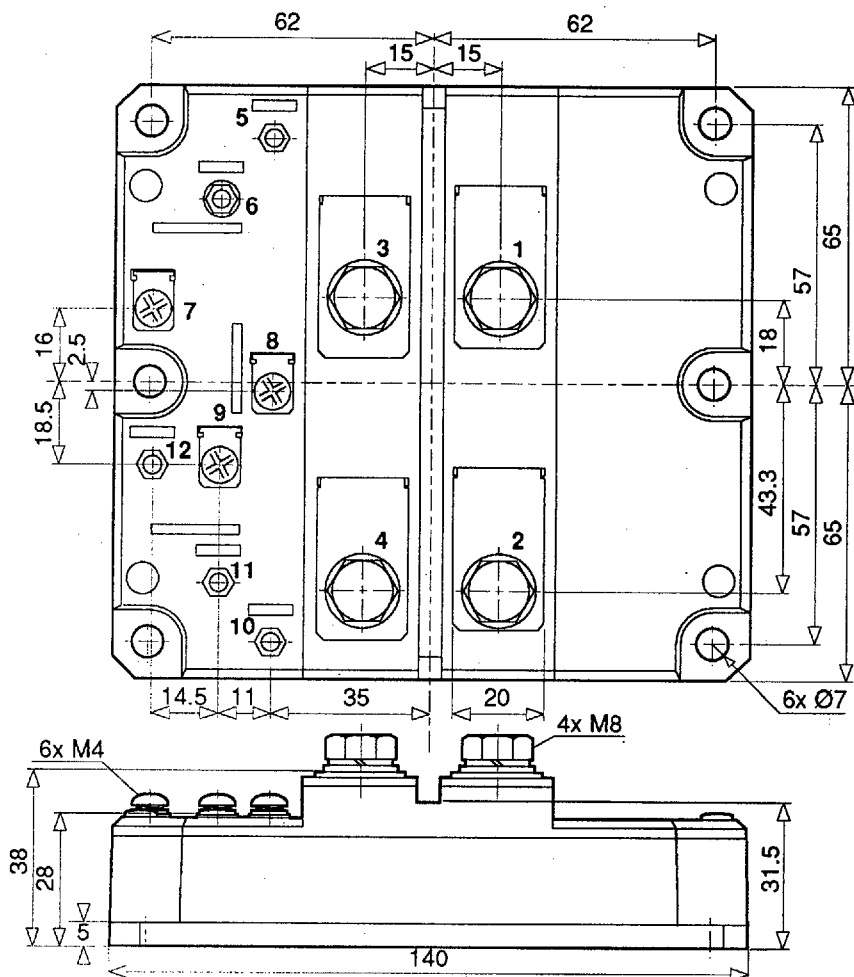
Recommended fixings for mounting:	M6
Recommended mounting torque:	5Nm (44lbs.ins)
Recommended torque for electrical connections (M6):	5Nm (44lbs.ins)
Max. torque for electrical connections:	8Nm (70lbs.ins)
Nominal weight:	265g



PACKAGE OUTLINE - D

Recommended fixings for mounting:	M6
Recommended mounting torque:	5Nm (44lbs.ins)
Recommended torque for electrical connections (M8):	8Nm (70lbs.ins)
Max. torque for electrical connections (M8):	10Nm (88lbs.ins)
Recommended torque for electrical connections (M4):	2Nm (18lbs.ins)

Nominal weight:	1500g
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PACKAGE OUTLINE F

Recommended fixings for mounting: M6
 Recommended mounting torque: 5Nm (44lbs.ins)
 Recommended torque for electrical connections (M8): 8Nm (70lbs.ins)
 Max. torque for electrical connections (M8): 10Nm (88lbs.ins)
 Recommended torque for electrical connections (M4): 2Nm (18lbs.ins)

Nominal weight: 1500g