SML400HB06

Attributes:
-aerospace build standard
-high reliability
-lightweight
-metal matrix base plate
-AlN isolation

Maximum rated values/ Electrical Properties

Collector-emitter Voltage		V_{ces}	600	V
DC Collector Current	Tc=70C, Tvj=175C Tc=25C,Tvj=175c	I_{cnom} Ic	400 500	A
Repetitive peak Collector Current	tp=1msec,Tc=80C	I_{crm}	800	A
Total PowerDissipation	Tc=25C	P_{tot}	850	W
Gate-emitter peak voltage		V_{ges}	+/-20	V
DC Forward Diode Current		I_f	400	A
Repetitive Peak Forward Current	tp=1msec	I_{frm}	800	A
I^2t value per diode	Vr=0V, tp=10msec, Tvj=125C Tvj=150C	I^2_t	11000 10500	A^2sec
Isolation test voltage	RMS, 50Hz, t=1min	V_{isol}	2500	V

Collector-emitter saturation voltage	Ic=400A,Vge=15V, Tc=25C Ic=400A,Vge=15V,Tc=125C Ic=400A,Vge=15V,Tc=150C	$V_{ce(sat)}$		1.55 1.6 1.7	1.9	V
Gate Threshold voltage	Ic=6.4mA,Vce=Vge, Tvj=25C	$Vge_{(th)}$	4.9	5.8	6.5	V
Input capacitance	f=1MHz,Tvj=25C,Vce=25V, Vge=0V	C_{ies}		26		nF
Reverse transfer Capacitance	f=1MHz,Tvj=25C,Vce=25V, Vge=0V	C_{res}		0.76		nF
Collector emitter cut off current	Vce=600V,Vge=0V,Tvj=25C Vce=600V,Vge=0V,Tvj=125C	I_{ces}		1 1	5	mA mA
Gate emitter cut off current	Vce=0V,Vge=20V,Tvj=25C	I_{ges}			400	nA

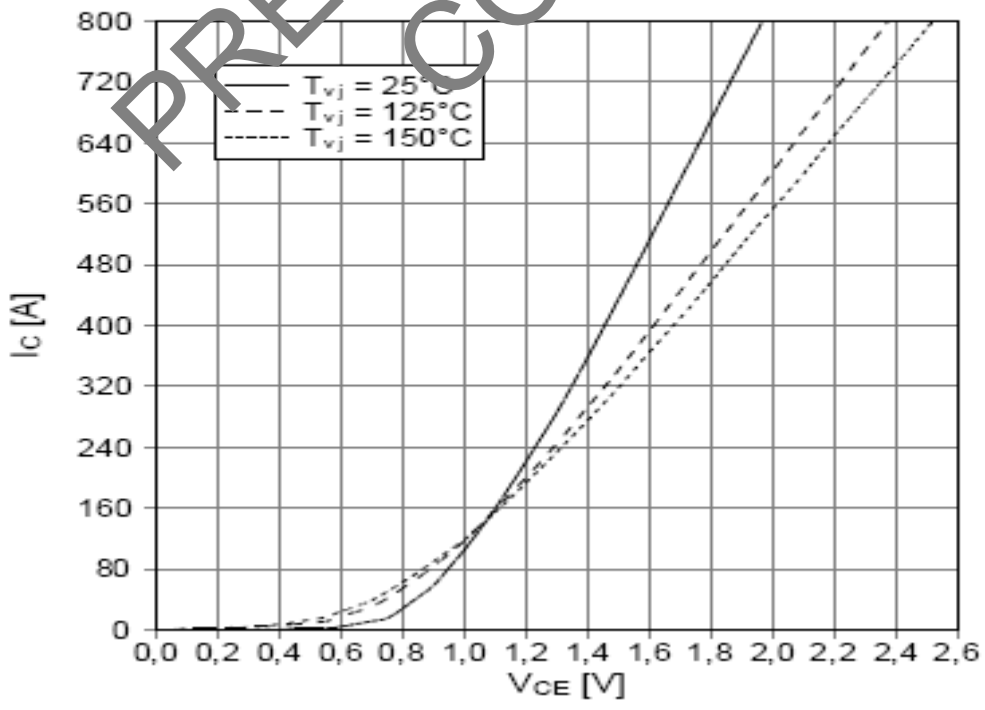
Turn on delay time	Ic=400A, Vcc=300V Vge=+/15V,Rg=1.5Ω,Tvj=25C Vge=+/-15V,Rg=1.5Ω,Tvj=125C Vge=+/-15V,Rg=1.5Ω,Tvj=150C	$t_{d,on}$		 110 120 130		 nsec nsec nsec
Rise time	Ic=400A, Vcc=300V Vge=+/-15V,Rg=1.5Ω,Tvj=25C Vge=+/-15V,Rg=1.5Ω,Tvj=125C Vge=+/-15V,Rg=1.5Ω,Tvj=150C	tr		 50 60 60		 nsec nsec nsec
Turn off delay time	Ic=400A, Vcc=300V Vge=+/-15V,Rg=1.5Ω,Tvj=25C Vge=+/-15V,Rg=1.5Ω,Tvj=125C Vge=+/-15V,Rg=1.5Ω,Tvj=150C	$t_{d,off}$		 490 520 530		 nsec nsec nsec
Fall time	Ic=400A, Vcc=300V Vge=+/-15V,Rg=1.5Ω,Tvj=25C Vge=+/-15V,Rg=1.5Ω,Tvj=125C Vge=+/-15V,Rg=1.5Ω,Tvj=150C	t_f		 50 70 70		 nsec nsec nsec
Turn energy loss per pulse	Ic=400A,Vce=300V,Vge=15V Rge=1.5Ω,L=30nH Tvj=125C Tvj=150C	E_{on}		 3.2 3.4		 mJ mJ
Turn off energy loss per pulse	Ic=400A,Vce=300V,Vge=15V Rge=1.5Ω,L=30nH Tvj=125C Tvj=150C	E_{off}		 15 15.5		 mJ mJ
SC Data	tp≤10µsec, Vge≤15V, Vcc=360V, Tvj=25C $Vce_{(max)}$=Vces-L*di/dt Tvj=150C	I_{sc}		 2800 2000		 A A
Stray Module inductance		$L_{\sigma ce}$		40		nH
Terminal-chip resistance		R_c		1.2		mΩ

Diode characteristics

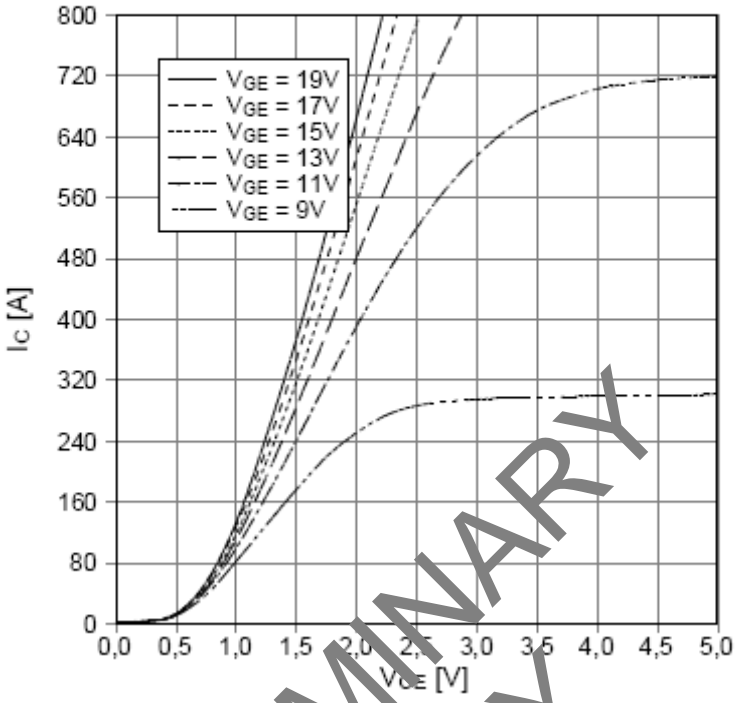
Forward voltage	Ic=400A,Vge=0V, Tc=25C Ic=400A,Vge=0V, Tc=125C Ic=400A,Vge=0V, Tc=150C	V_f		1.55 1.5 1.4	1.9	V V V
Peak reverse recovery current	If=400A, -di/dt=7000A/µsec Vce=300V,Vge=-10V,Tvj=25C Vce=300V,Vge=-10V,Tvj=125C Vce=300V,Vge=-10V,Tvj=150C	I_{rm}		 270 330 350		 A A A
Recovered charge	If=400A, -di/dt=7000A/µsec Vce=600V,Vge=-10V,Tvj=25C Vce=600V,Vge=-10V,Tvj=125C Vce=600V,Vge=-10V,Tvj=150C	Qr		 15 29 32		 µC µC µC
Reverse recovery energy	If=400A, -di/dt=7000A/µsec Vce=600V,Vge=-10V,Tvj=25C Vce=600V,Vge=-10V,Tvj=125C Vce=600V,Vge=-10V,Tvj=150C	E_{rec}		 3.6 7.4 8.3		 mJ mJ mJ

Thermal Properties			Min	Typ	Max	
Thermal resistance junction to case	Igbt Diode	$R_{\theta J-C}$			0.09 0.1	K/W
Thermal resistance case to heatsink		$R_{\theta C-hs}$		0.03		K/W
Maximum junction temperature		Tvj			175	C
Maximum operating temperature		Top	-55		175	C
Storage Temperature		Tstg	-55		175	C

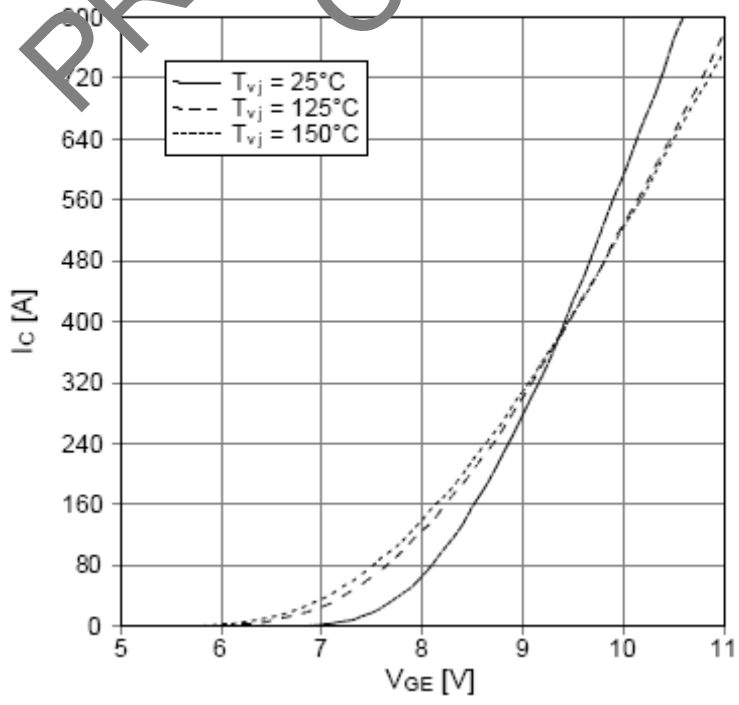
output characteristic IGBT inverter (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



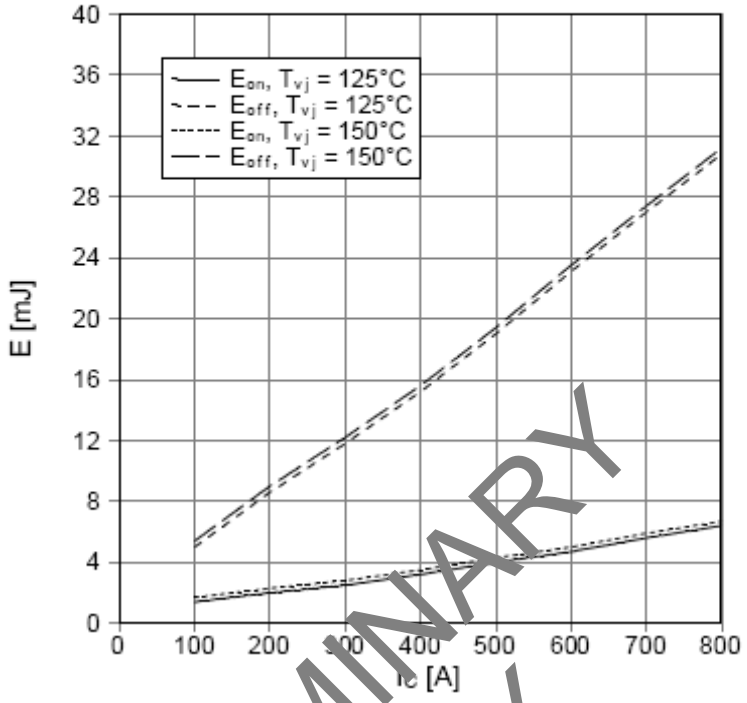
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



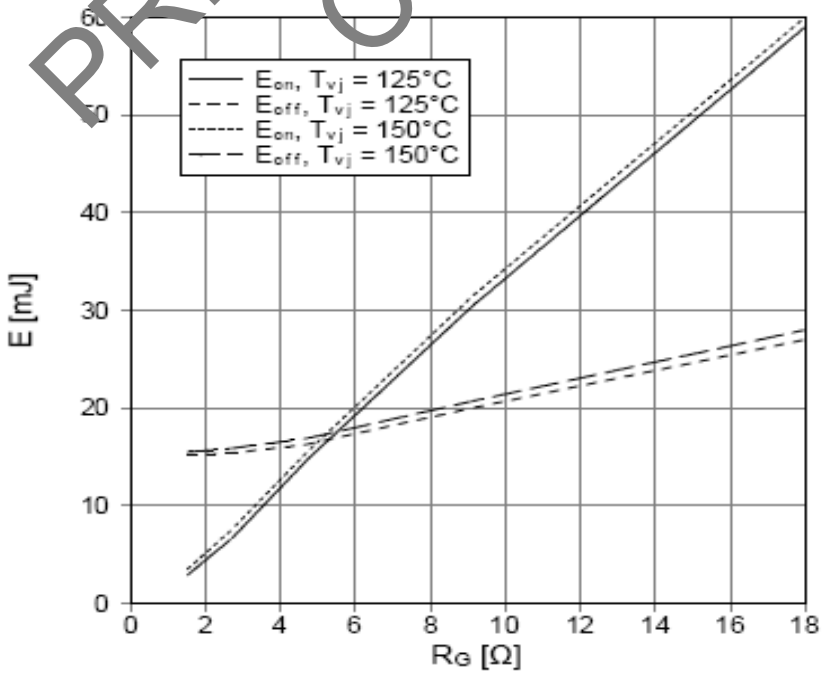
transfer characteristic IGBT-inverter (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



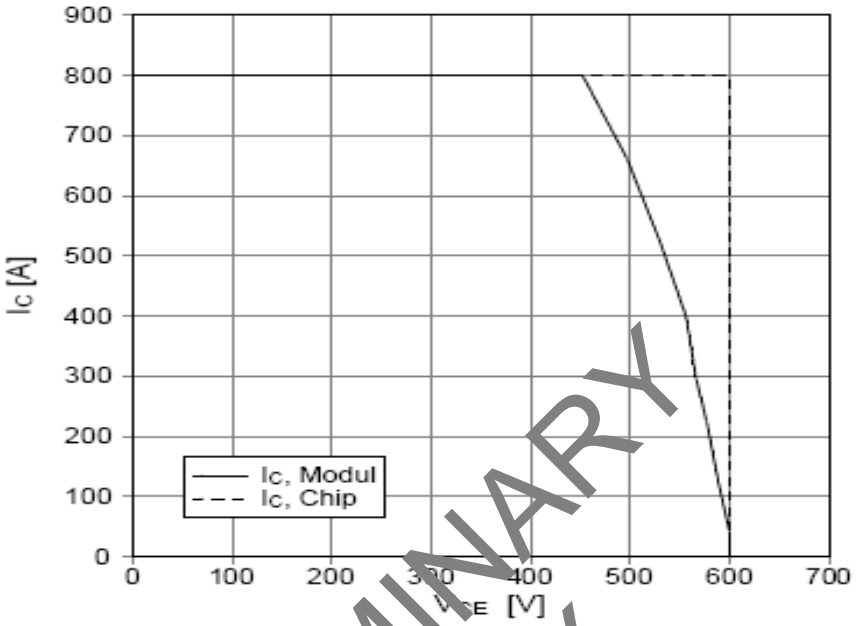
switching losses IGBT-inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 1,5 Ω, R_{Goff} = 1,5 Ω, V_{CE} = 300 V



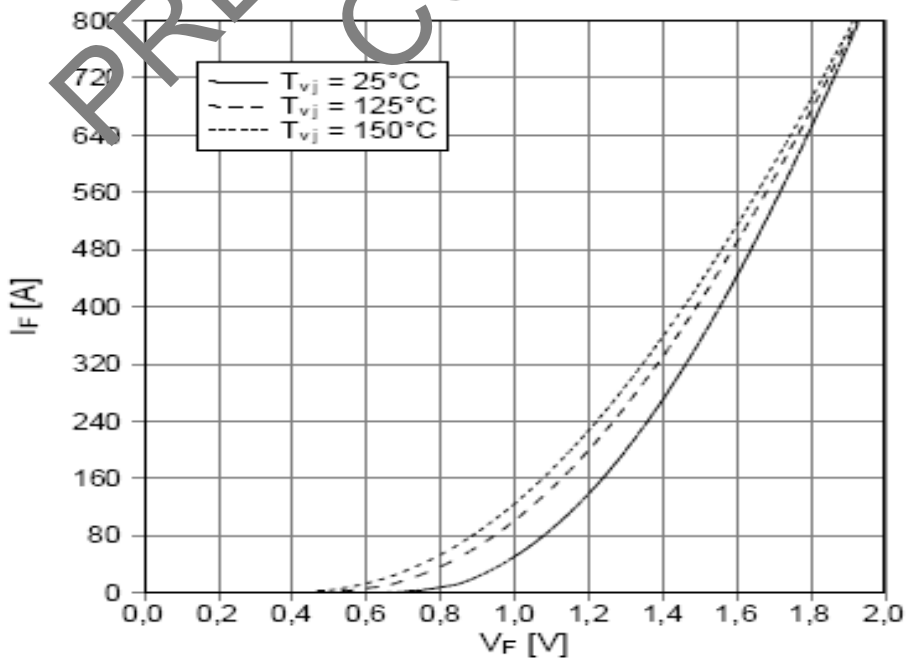
switching losses IGBT-inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 300 A, V_{CE} = 300 V

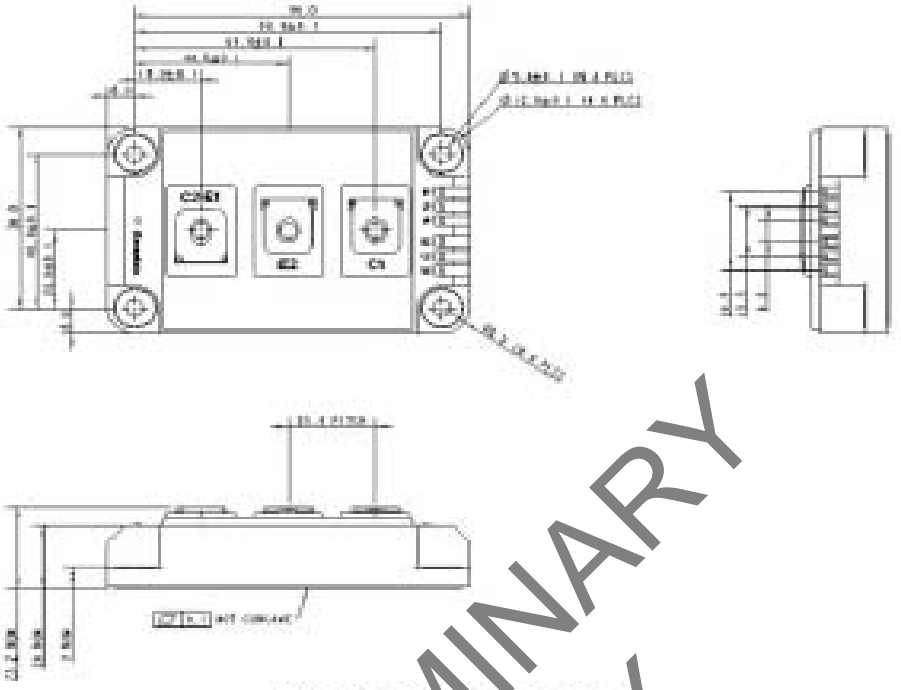


reverse bias safe operating area IGBT-inv. (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 1{,}5\ \Omega$, $T_{vj} = 150°C$

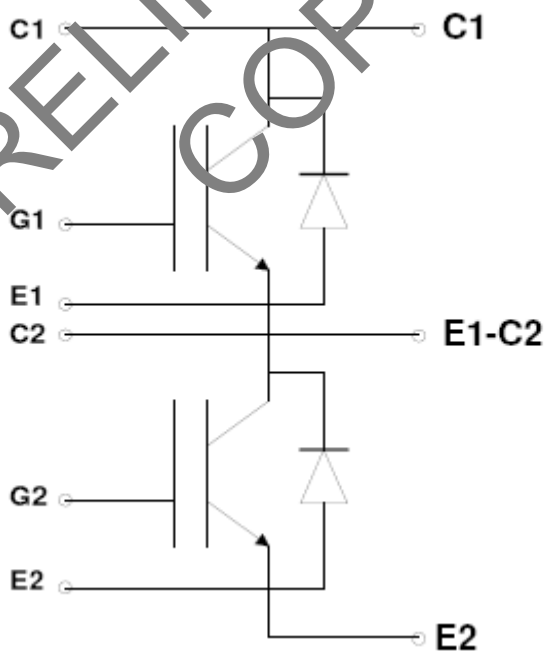


forward characteristic of diode inverter (typical)
$I_F = f(V_F)$





All dimensions in mm



CIRCUIT DIAGRAM