

SML300HB06

Attributes:

- aerospace build standard
- high reliability
- lightweight
- metal matrix base plate
- AlN isolation
- trench gate igbts


Maximum rated values/ Electrical Properties

Collector-emitter Voltage		V_{ce}	600	V
DC Collector Current	$T_c=70C, T_{vj}=175C$ $T_c=25C, T_{vj}=175C$	$I_{c, nom}$ I_c	300 400	A
Repetitive peak Collector Current	$tp=1msec, T_c=80C$	I_{crm}	600	A
Total Power Dissipation	$T_c=25C$	P_{tot}	1250	W
Gate-emitter peak voltage		V_{ges}	+/-20	V
DC Forward Diode Current		I_f	300	A
Repetitive Peak Forward Current	$tp=1msec$	I_{frm}	600	A
I^2t value per diode	$V_f=0V, tp=10msec,$ $T_{vj}=125C$ $T_{vj}=150C$	I^2_t	8400 7900	A^2sec
Isolation voltage	RMS, 50Hz, $t=1min$	V_{isol}	2500	V

Collector-emitter saturation voltage	$I_c=300A, V_{ge}=15V, T_c=25C$ $I_c=300A, V_{ge}=15V, T_c=125C$ $I_c=300A, V_{ge}=15V, T_c=150C$	$V_{ce(sat)}$		1.45 1.6 1.7	1.9	V
Gate Threshold voltage	$I_c=4.8mA, V_{ce}=V_{ge}, T_{vj}=25C$	$V_{ge(th)}$	4.9	5.8	6.5	V
Input capacitance	$f=1MHz, T_{vj}=25C, V_{ce}=25V,$ $V_{ge}=0V$	C_{ies}		19		nF
Reverse transfer Capacitance	$f=1MHz, T_{vj}=25C, V_{ce}=25V,$ $V_{ge}=0V$	C_{res}		0.57		nF
Collector emitter cut off current	$V_{ce}=600V, V_{ge}=0V, T_{vj}=25C$ $V_{ce}=600V, V_{ge}=0V, T_{vj}=125C$	I_{ccs}		1 1	5	mA mA
Gate emitter cut off current	$V_{ce}=0V, V_{ge}=20V, T_{vj}=25C$	I_{ges}			400	nA



Turn on delay time	Ic=300A, Vcc=300V Vge=+/-15V, Rg=2.4Ω, Tvj=25C Vge=+/-15V, Rg=2.4Ω, Tvj=125C Vge=+/-15V, Rg=2.4Ω, Tvj=150C	t _{d,on}	110 120 130	nsec nsec nsec
Rise time	Ic=300A, Vcc=300V Vge=+/-15V, Rg=2.4Ω, Tvj=25C Vge=+/-15V, Rg=2.4Ω, Tvj=125C Vge=+/-15V, Rg=2.4Ω, Tvj=150C	t _r	50 60 60	nsec nsec nsec
Turn off delay time	Ic=300A, Vcc=300V Vge=+/-15V, Rg=2.4Ω, Tvj=25C Vge=+/-15V, Rg=2.4Ω, Tvj=125C Vge=+/-15V, Rg=2.4Ω, Tvj=150C	t _{d,off}	490 520 530	nsec nsec nsec
Fall time	Ic=300A, Vcc=300V Vge=+/-15V, Rg=2.4Ω, Tvj=25C Vge=+/-15V, Rg=2.4Ω, Tvj=125C Vge=+/-15V, Rg=2.4Ω, Tvj=150C	t _f	50 70 70	nsec nsec nsec
Turn on energy loss per pulse	Ic=300A, Vce=300V, Vge=+/-15V Rge=2.4Ω, L=30nH Tvj=125C di/dt=6500A/μsec Tvj=150C	E _{on}	3.1 3.3	mJ mJ
Turn off energy loss per pulse	Ic=300A, Vce=300V, Vge=+/-15V Rge=2.4Ω, L=30nH Tvj=125C di/dt=6500A/μsec Tvj=150C	E _{off}	15 15.5	mJ mJ
SC Data	tp≤10μsec, Vge≤15V Vcc=360V, Tvj=25C Vce(max)=Vces-Lσdi/dt Tvj=150C	I _{sc}	2100 1500	A A
Stray Module inductance		L _{σce}	40	nH
Terminal-chip resistance		R _c	1.2	mΩ

Diode characteristics

Forward voltage	Ic=300A, Vge=0V, Tc=25C Ic=300A, Vge=0V, Tc=125C Ic=300A, Vge=0V, Tc=150C	V _f	1.55 1.5 1.45	1.95	V V V
Peak reverse recovery current	If=300A, -di/dt=6500A/μsec Vce=300V, Vge=-15V, Tvj=25C Vce=300V, Vge=-15V, Tvj=125C Vce=300V, Vge=-15V, Tvj=150C	I _{rm}	190 235 250		A A A
Recovered charge	If=300A, -di/dt=6500A/μsec Vce=300V, Vge=-15V, Tvj=25C Vce=300V, Vge=-15V, Tvj=125C Vce=300V, Vge=-15V, Tvj=150C	Q _r	13 24 28		μC μC μC
Reverse recovery energy	If=300A, -di/dt=6500A/μsec Vce=300V, Vge=-15V, Tvj=25C Vce=300V, Vge=-15V, Tvj=125C Vce=300V, Vge=-15V, Tvj=150C	E _{rec}	3.4 6.2 7.0		mJ mJ mJ



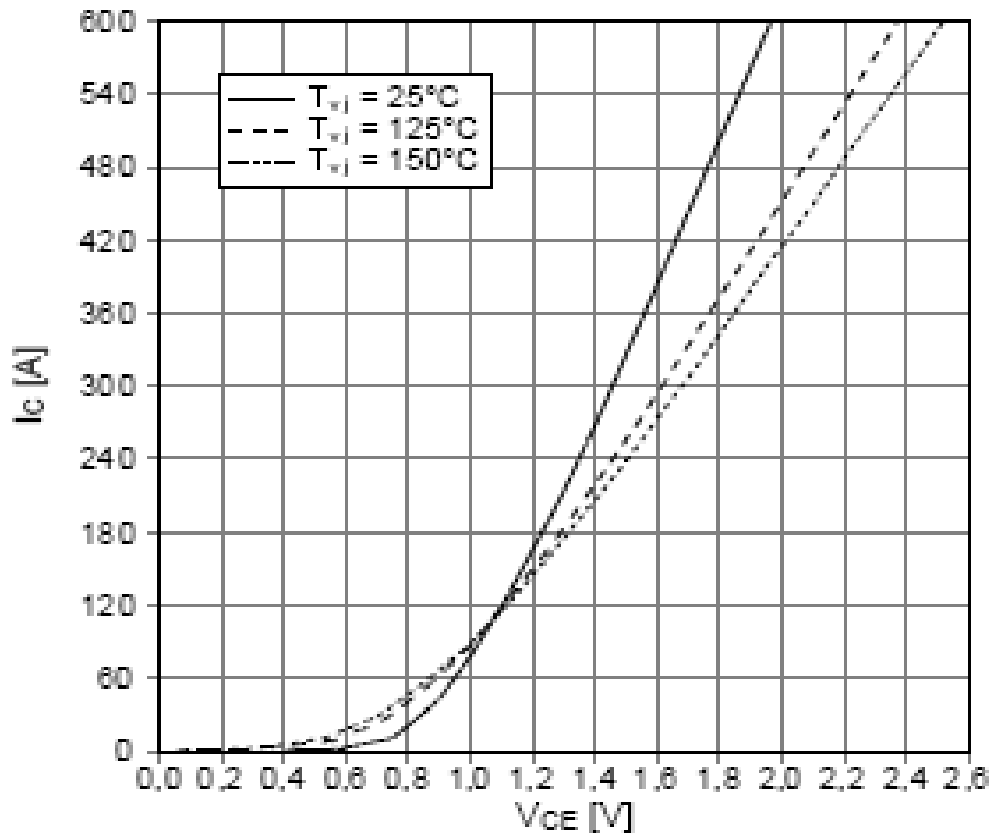
Thermal Properties

			Min	Typ	Max	
Thermal resistance junction to case	Igbt Diode	$R_{\theta J-C}$			0.12 0.16	K/W
Thermal resistance case to heatsink		$R_{\theta C-HS}$		0.03		K/W
Maximum junction temperature		T_{vj}			175	C
Maximum operating temperature		T_{op}	-55		175	C
Storage Temperature		T_{stg}	-55		175	C

output characteristic IGBT-Inverter (typical)

$$I_C = f(V_{CE})$$

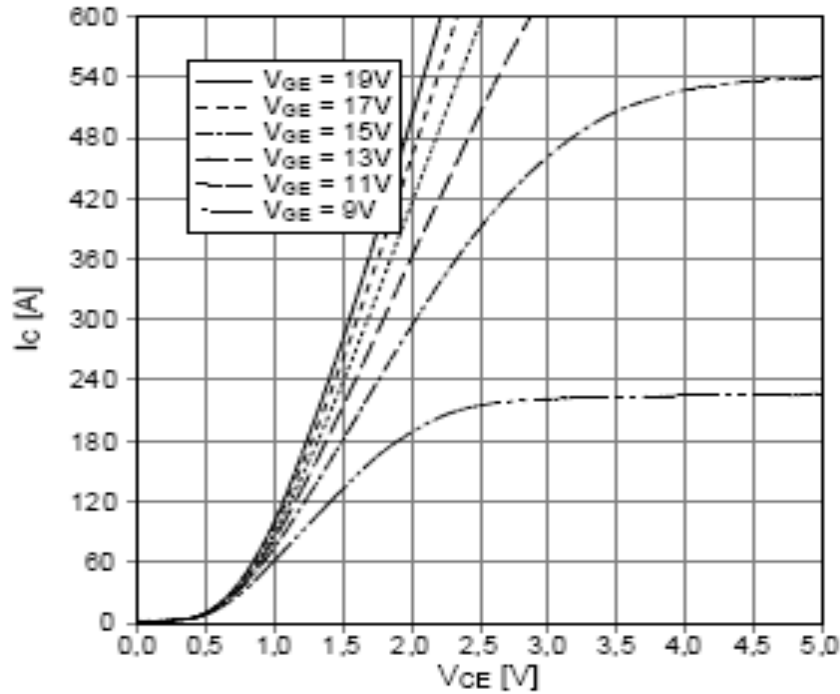
$$V_{GE} = 15 \text{ V}$$





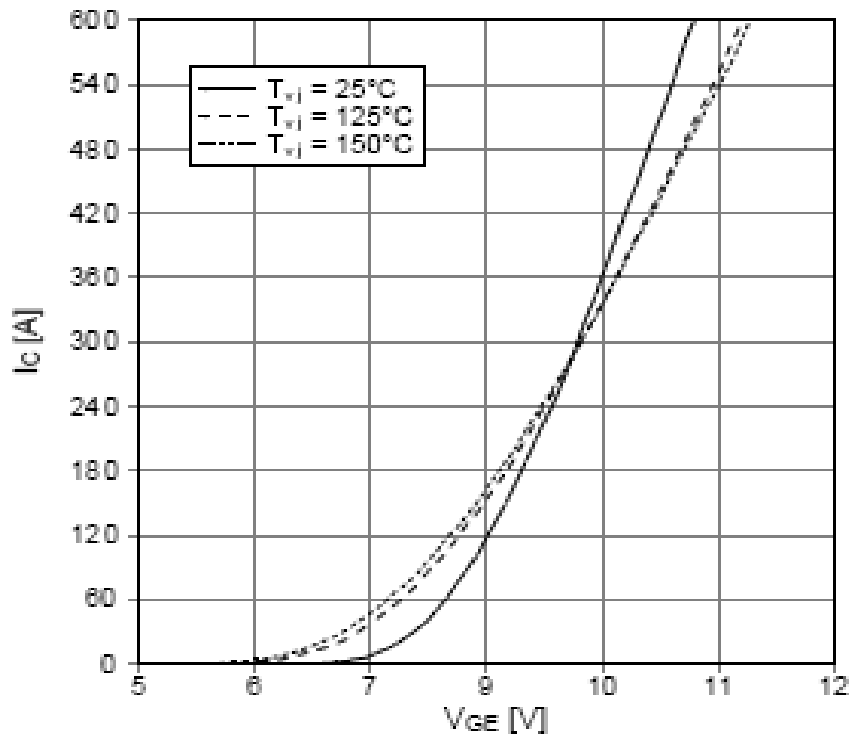
output characteristic IGBT-inverter (typical)

$I_C = f(V_{CE})$
 $T_{vj} = 150^\circ\text{C}$



transfer characteristic IGBT-inverter (typical)

$I_C = f(V_{GE})$
 $V_{CE} = 20\text{ V}$

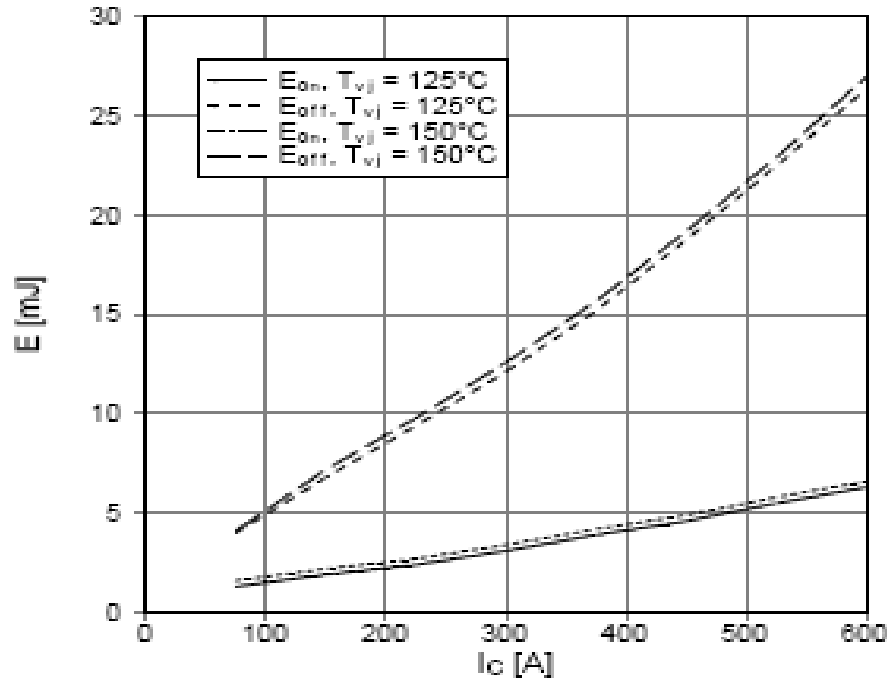




switching losses IGBT-inverter (typical)

$$E_{on} = f(I_C), E_{off} = f(I_C)$$

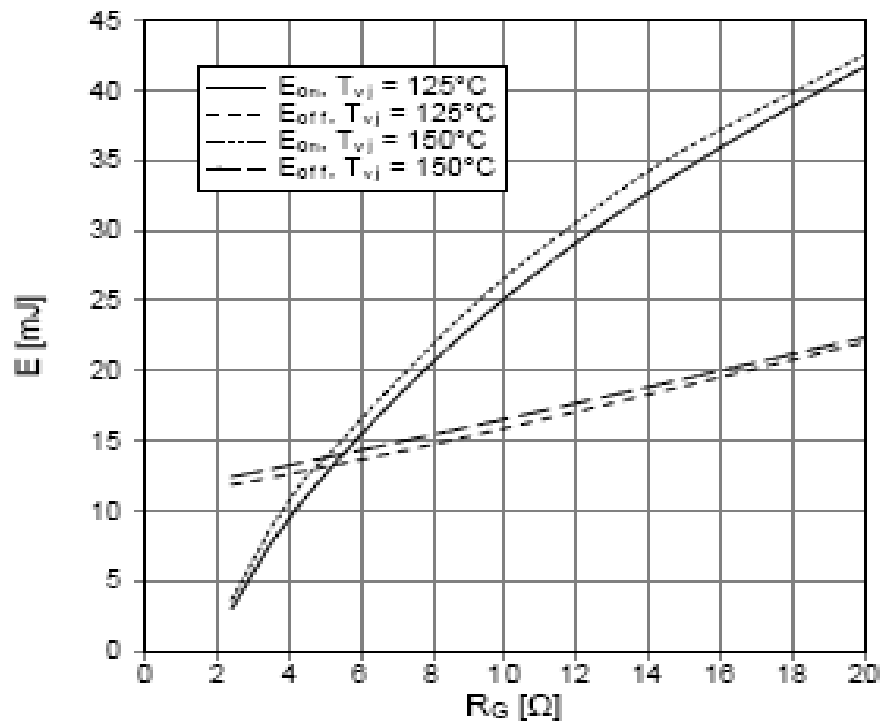
$$V_{GE} = \pm 15 \text{ V}, R_{Gon} = 2,4 \Omega, R_{Goff} = 2,4 \Omega, V_{CE} = 300 \text{ V}$$



switching losses IGBT-Inverter (typical)

$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$$V_{GE} = \pm 15 \text{ V}, I_C = 300 \text{ A}, V_{CE} = 300 \text{ V}$$

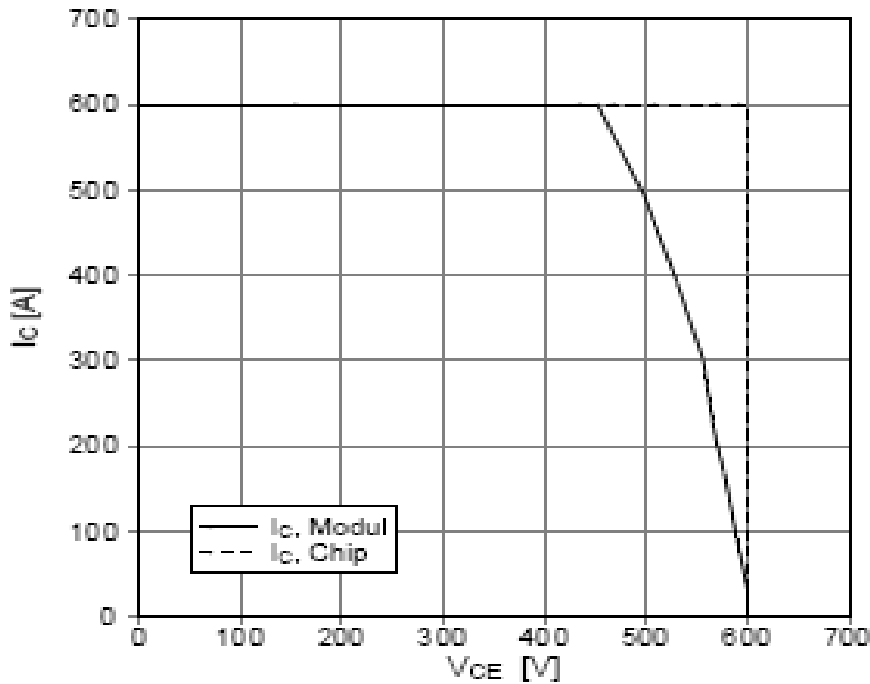




reverse bias safe operating area IGBT-inv. (RBSOA)

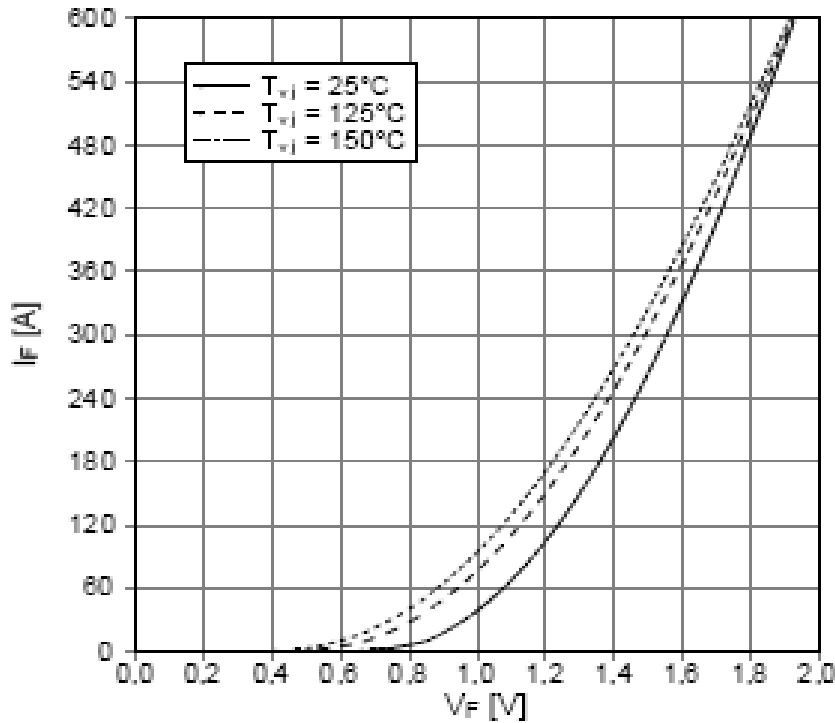
$$I_C = f(V_{CE})$$

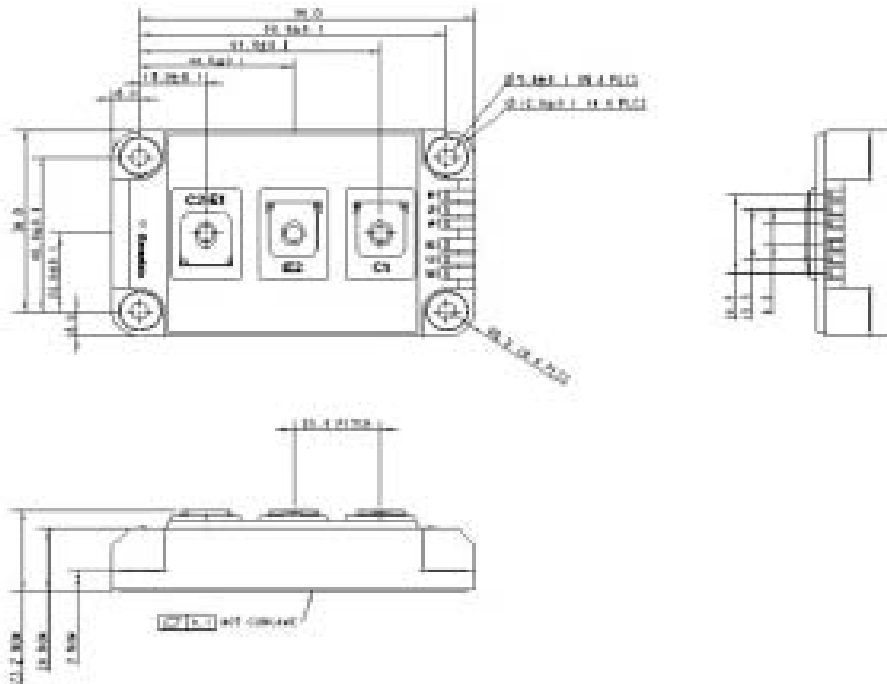
$$V_{CE} = \pm 15 \text{ V}, R_{Goff} = 2,4 \Omega, T_{vj} = 150^\circ\text{C}$$



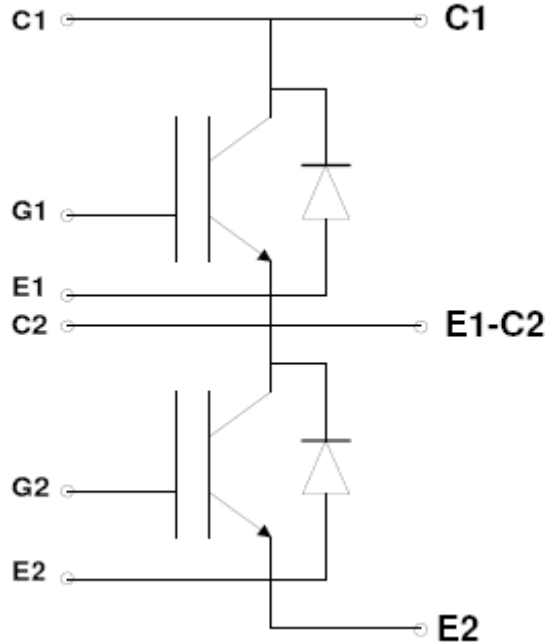
forward characteristic of diode-inverter (typical)

$$I_F = f(V_F)$$





All dimensions in mm



CIRCUIT DIAGRAM