

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 ² t value per diode	V _r =0V, tp=10msec, T _{vj} =125C T _{vj} =150C	I ² _t	8400 7900	A ² sec
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 _{ces}		1 1	5	mA mA
Gate emitter cut off current	V _{ce} =0V, V _{ge} =20V, T _{vj} =25C	I _{ges}			400	nA

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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



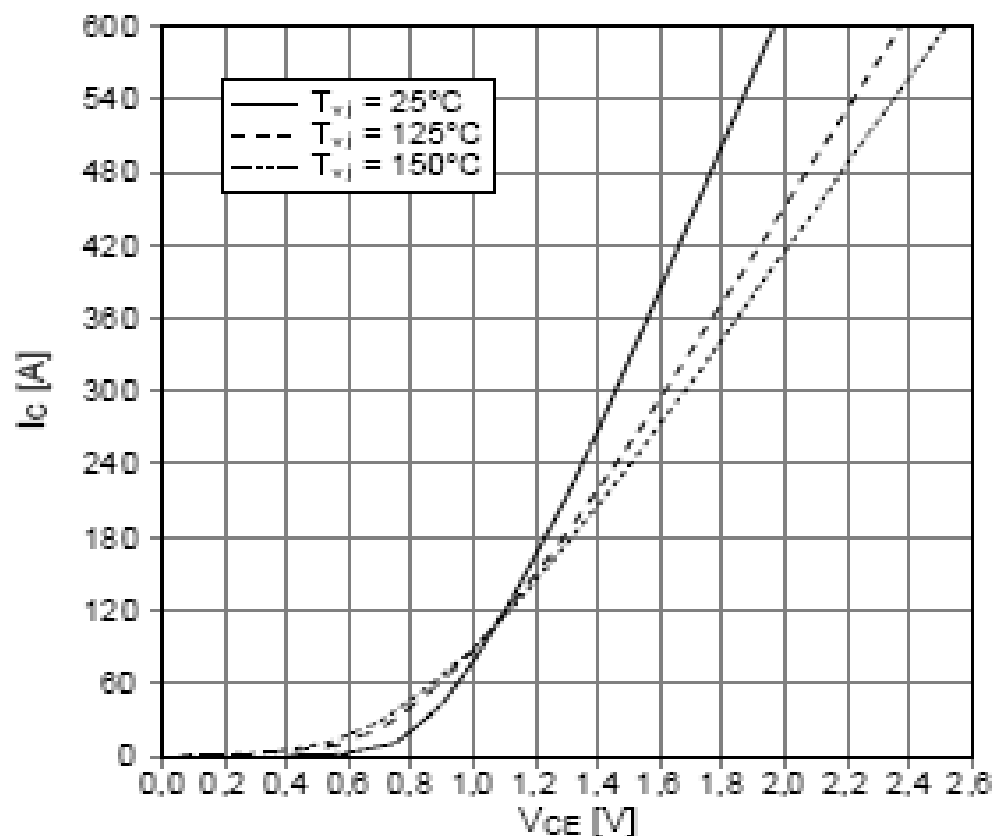
Thermal Properties

			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)

$I_C = f(V_{CE})$

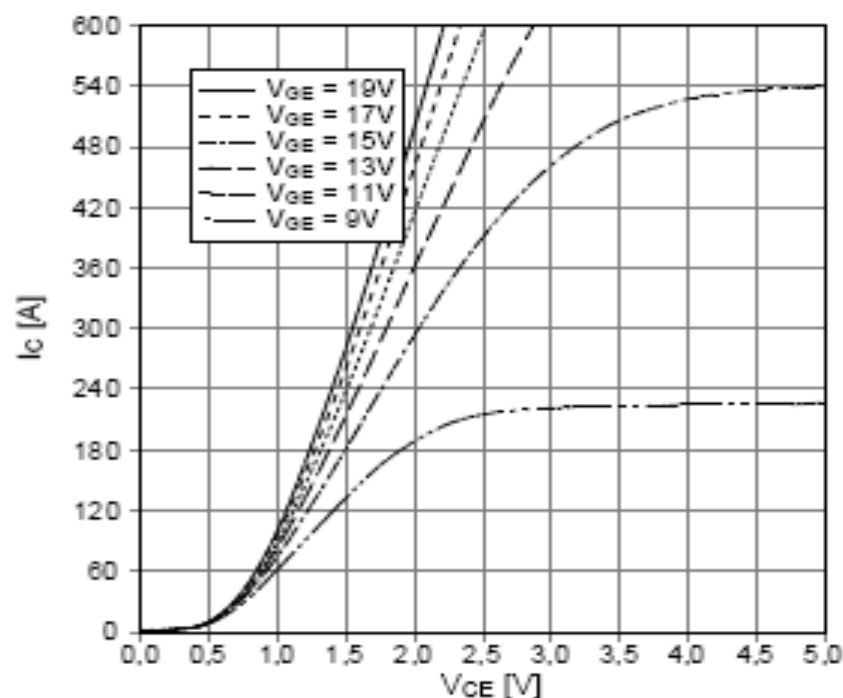
$V_{GE} = 15\text{ V}$



**output characteristic IGBT-inverter (typical)**

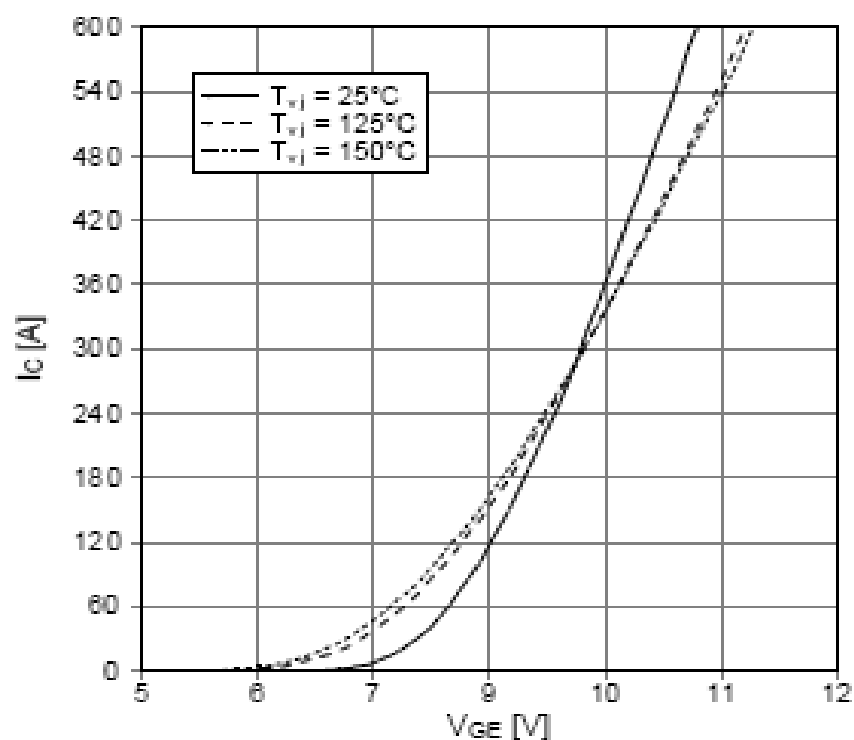
$$I_C = f(V_{CE})$$

$$T_{vj} = 150^{\circ}\text{C}$$

**transfer characteristic IGBT-inverter (typical)**

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

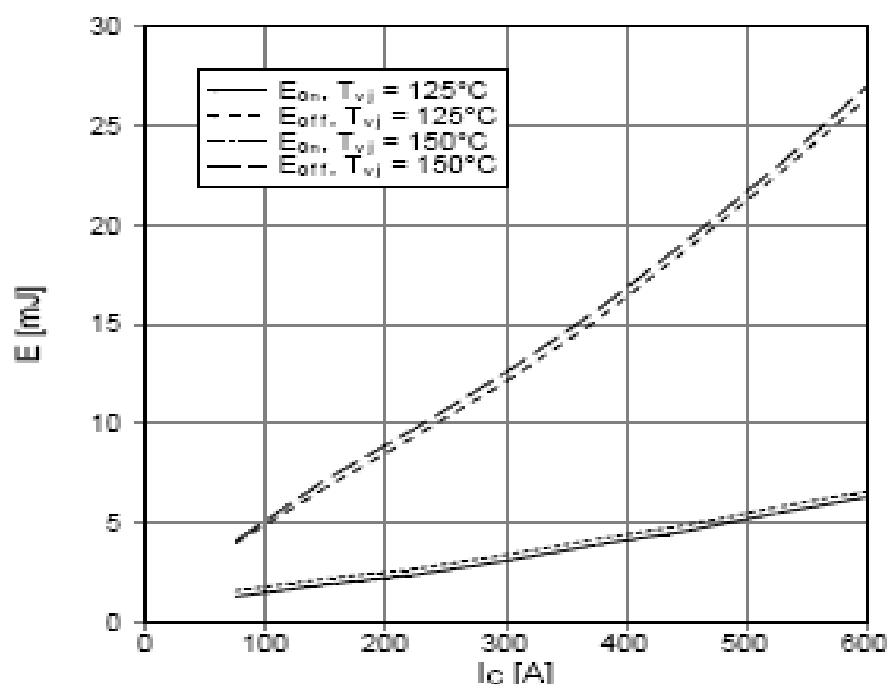
$$V_{CE} = 20\text{ V}$$



switching losses IGBT-inverter (typical)

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

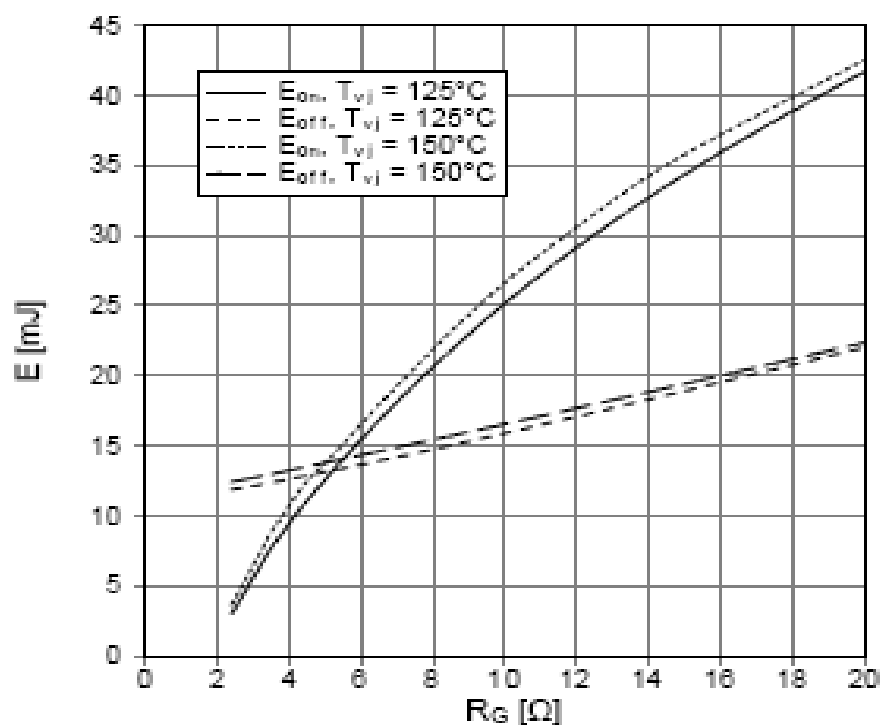
$$V_{GE} = \pm 15 \text{ V}, R_{Gon} = 2,4 \text{ } \Omega, R_{Goff} = 2,4 \text{ } \Omega, V_{CE} = 300 \text{ V}$$



switching losses IGBT-Inverter (typical)

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

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

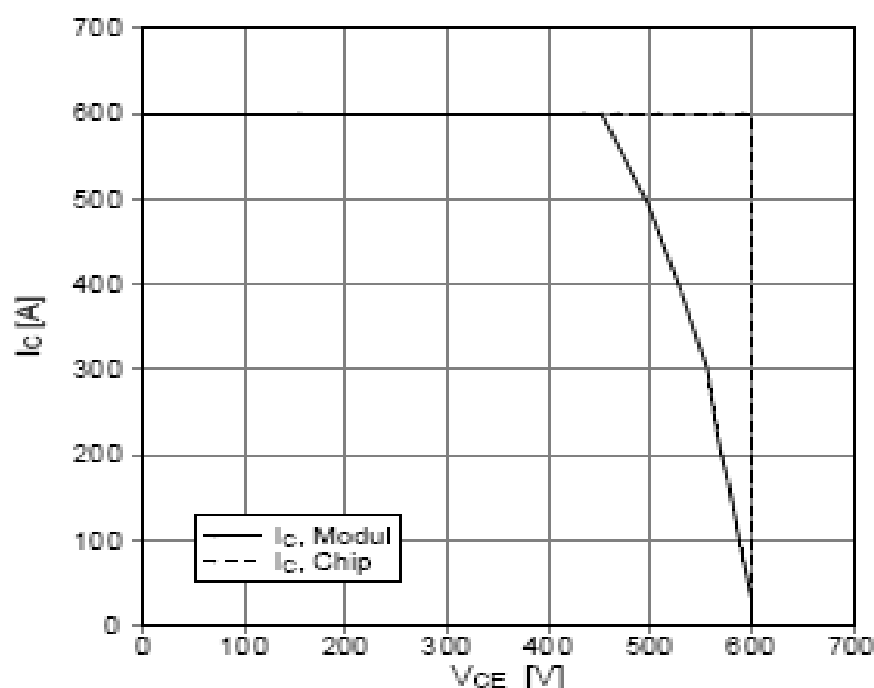




reverse bias safe operating area IGBT-inv. (RBSOA)

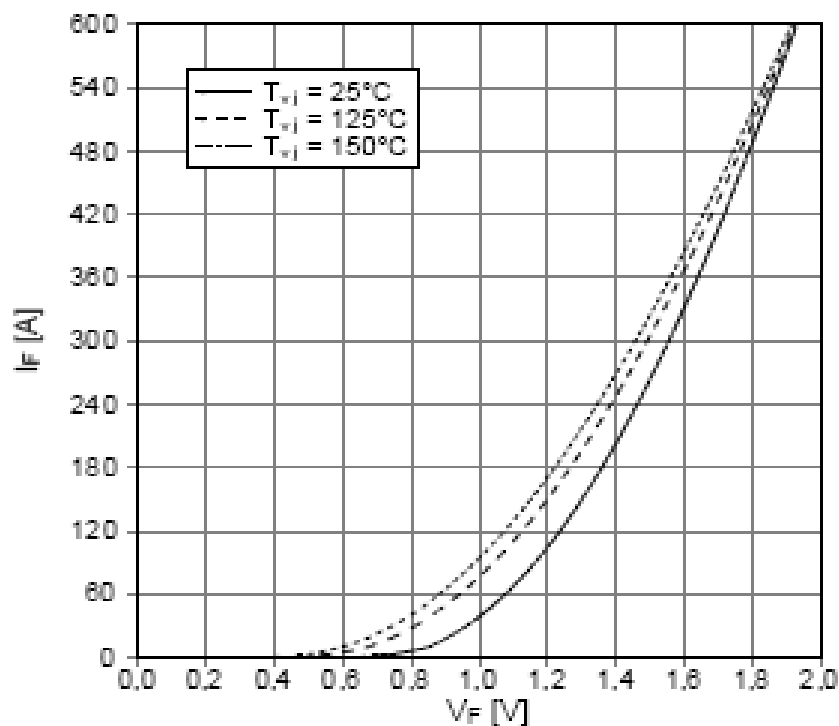
$I_C = f(V_{CE})$

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



forward characteristic of diode-inverter (typical)

$I_F = f(V_F)$

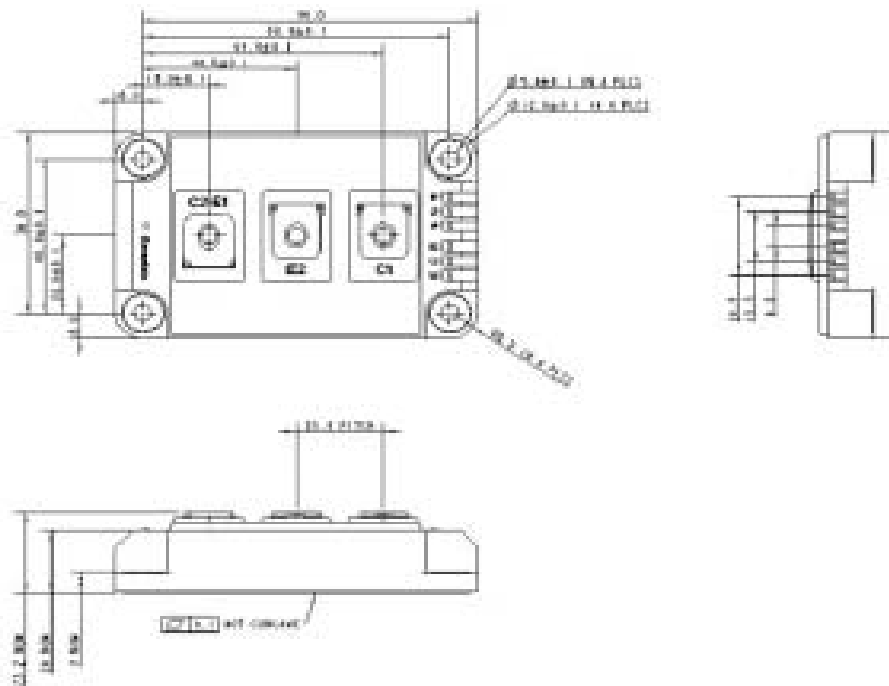




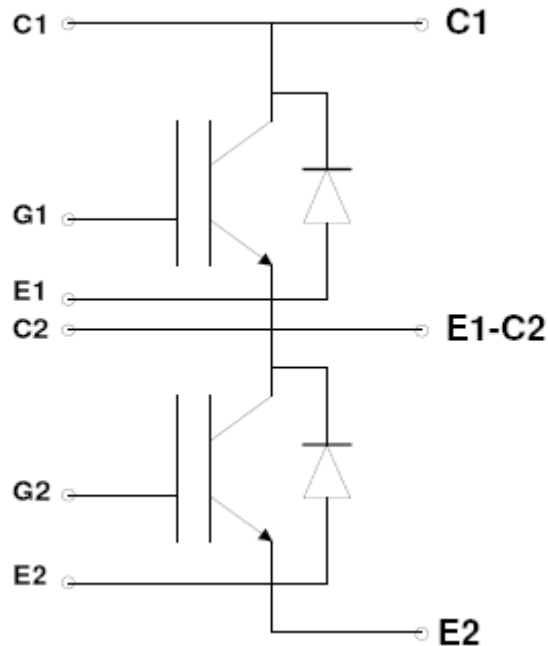
**SEME
LAB**

P O W E R

HIGH PERFORMANCE POWER SEMICONDUCTORS



All dimensions in mm



CIRCUIT DIAGRAM

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