



SEMiX® 2s

SEMiX302GB12Vs

Features

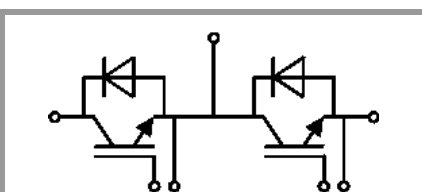
- Homogeneous Si
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125^\circ\text{C}$ max.
- Product reliability results are valid for $T_J=150^\circ\text{C}$
- Dynamic values apply to the following combination of resistors:
 $R_{Gon,main} = 0,5 \Omega$
 $R_{Goff,main} = 0,5 \Omega$
 $R_{G,X} = 2,2 \Omega$
 $R_{E,X} = 0,5 \Omega$



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Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
IGBT			
V_{CES}	$T_J = 25^\circ\text{C}$	1200	V
I_C	$T_J = 175^\circ\text{C}$	$T_C = 25^\circ\text{C}$	448
		$T_C = 80^\circ\text{C}$	342
I_{Cnom}		300	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	900	A
V_{GES}		-20 ... 20	V
t_{psc}	$V_{CC} = 720 \text{ V}$ $V_{GE} \leq 15 \text{ V}$ $V_{CES} \leq 1200 \text{ V}$	$T_J = 125^\circ\text{C}$	10
T_J		-40 ... 175	$^\circ\text{C}$
Inverse diode			
I_F	$T_J = 175^\circ\text{C}$	$T_C = 25^\circ\text{C}$	356
		$T_C = 80^\circ\text{C}$	266
I_{Fnom}		300	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	900	A
I_{FSM}	$t_p = 10 \text{ ms, sin } 180^\circ, T_J = 25^\circ\text{C}$	1620	A
T_J		-40 ... 175	$^\circ\text{C}$
Module			
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$	600	A
T_{stg}		-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50Hz, $t = 1 \text{ min}$	4000	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 300 \text{ A}$ $V_{GE} = 15 \text{ V}$ chipelevel	$T_J = 25^\circ\text{C}$	1.75	2.2	V
		$T_J = 150^\circ\text{C}$	2.2	2.5	V
V_{CE0}		$T_J = 25^\circ\text{C}$	0.94	1.04	V
		$T_J = 150^\circ\text{C}$	0.88	0.98	V
r_{CE}	$V_{GE} = 15 \text{ V}$	$T_J = 25^\circ\text{C}$	2.7	3.9	m Ω
		$T_J = 150^\circ\text{C}$	4.4	5.1	m Ω
$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C = 12 \text{ mA}$	5.5	6	6.5	V
I_{CES}	$V_{GE} = 0 \text{ V}$ $V_{CE} = 1200 \text{ V}$	$T_J = 25^\circ\text{C}$	0.1	0.3	mA
		$T_J = 150^\circ\text{C}$			mA
C_{ies}	$V_{CE} = 25 \text{ V}$ $V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$	18.0		nF
C_{oes}		$f = 1 \text{ MHz}$	1.77		nF
C_{res}		$f = 1 \text{ MHz}$	1.77		nF
Q_G	$V_{GE} = -8 \text{ V} \dots +15 \text{ V}$		3300		nC
R_{Gint}	$T_J = 25^\circ\text{C}$		2.50		Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$	$T_J = 150^\circ\text{C}$	424		ns
t_r	$I_C = 300 \text{ A}$	$T_J = 150^\circ\text{C}$	64		ns
E_{on}	$V_{GE} = \pm 15 \text{ V}$	$T_J = 150^\circ\text{C}$	37.3		mJ
$t_{d(off)}$	$R_{Gon} = 1.9 \Omega$	$T_J = 150^\circ\text{C}$	619		ns
t_f	$R_{Goff} = 1.9 \Omega$	$T_J = 150^\circ\text{C}$	90		ns
E_{off}	$di/dt_{on} = 5700 \text{ A}/\mu\text{s}$ $di/dt_{off} = 3000 \text{ A}/\mu\text{s}$ $du/dt_{off} = 6500 \text{ V}/\mu\text{s}$	$T_J = 150^\circ\text{C}$	36.1		mJ
$R_{th(j-c)}$	per IGBT			0.1	K/W



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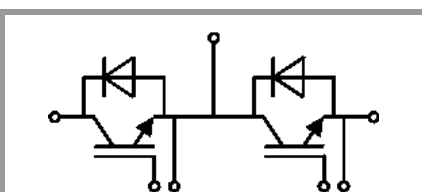
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 300 A V _{GE} = 0 V chip	T _j = 25 °C		2.1	2.46	V
		T _j = 150 °C		2.1	2.4	V
V _{F0}		T _j = 25 °C	1.1	1.3	1.5	V
		T _j = 150 °C	0.7	0.9	1.1	V
r _F		T _j = 25 °C	2.2	2.8	3.2	mΩ
		T _j = 150 °C	3.5	3.9	4.3	mΩ
I _{RRM}	I _F = 300 A di/dt _{off} = 5800 A/μs V _{GE} = -15 V V _{CC} = 600 V	T _j = 150 °C		318		A
Q _{rr}		T _j = 150 °C		54		μC
E _{rr}		T _j = 150 °C		21.8		mJ
R _{th(j-c)}	per diode				0.17	K/W
Module						
L _{CE}				18		nH
R _{CC'+EE'}	res., terminal-chip	T _C = 25 °C		0.7		mΩ
		T _C = 125 °C		1		mΩ
R _{th(c-s)}	per module			0.045		K/W
M _s	to heat sink (M5)		3		5	Nm
M _t		to terminals (M6)	2.5		5	Nm
						Nm
w					250	g
Temperatur Sensor						
R ₁₀₀	T _c =100°C (R ₂₅ =5 kΩ)			493 ± 5%		Ω
B _{100/125}	R _(T) =R ₁₀₀ exp[B _{100/125} (1/T-1/T ₁₀₀)]; T[K];			3550 ±2%		K



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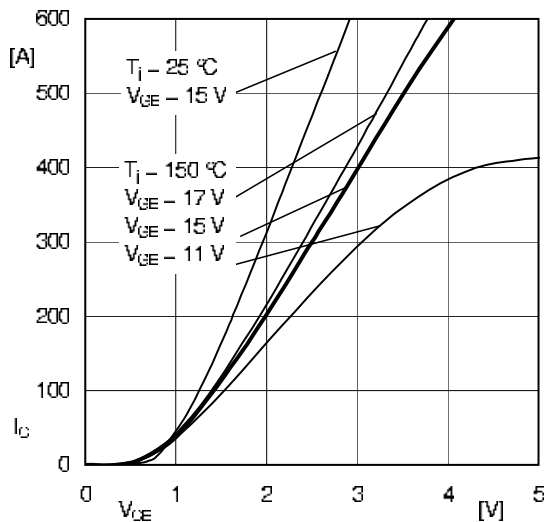


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_E$

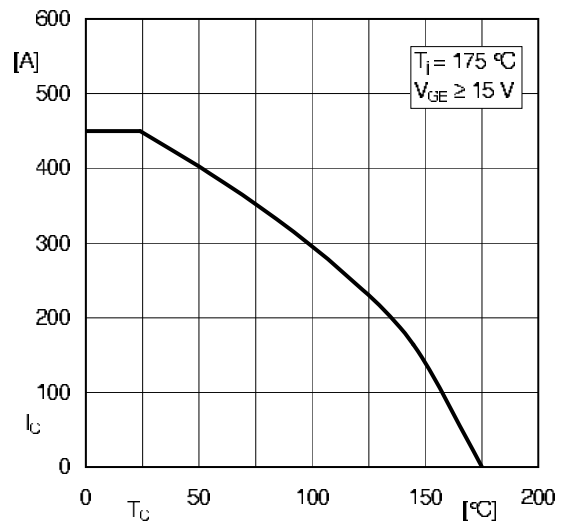


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

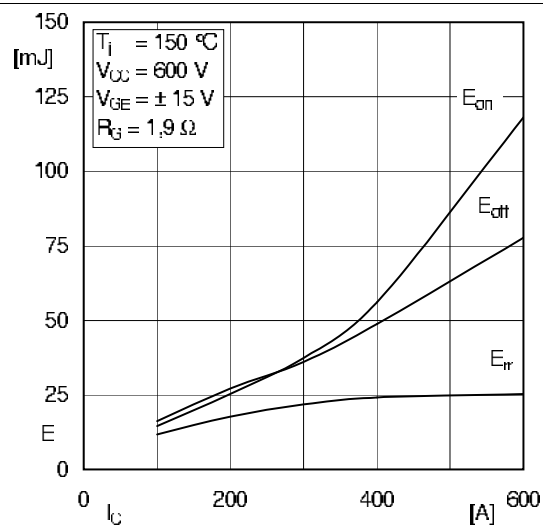


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

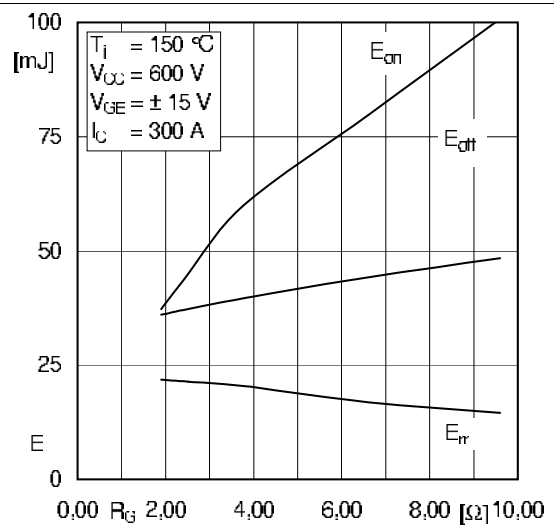


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

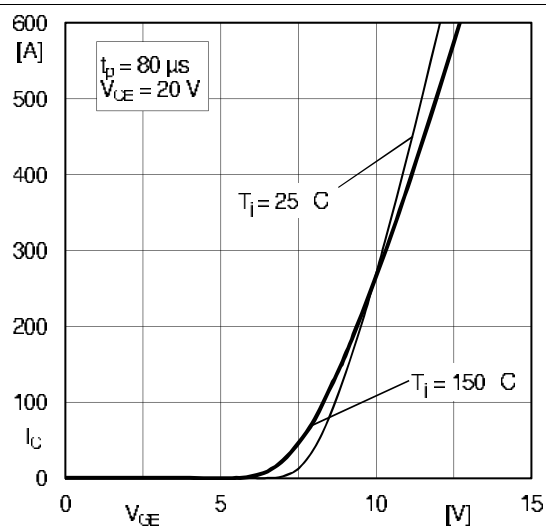


Fig. 5: Typ. transfer characteristic

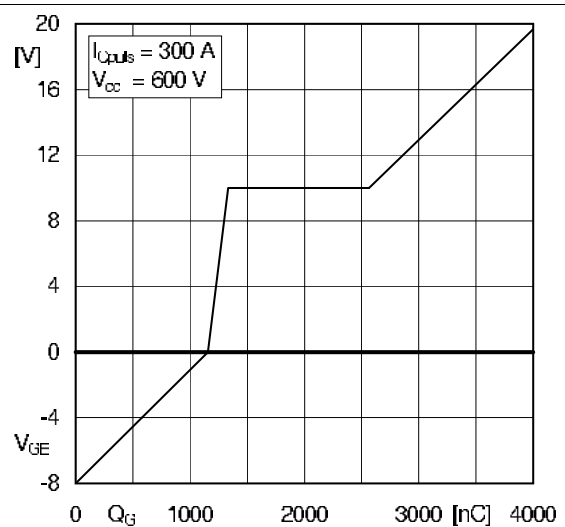


Fig. 6: Typ. gate charge characteristic

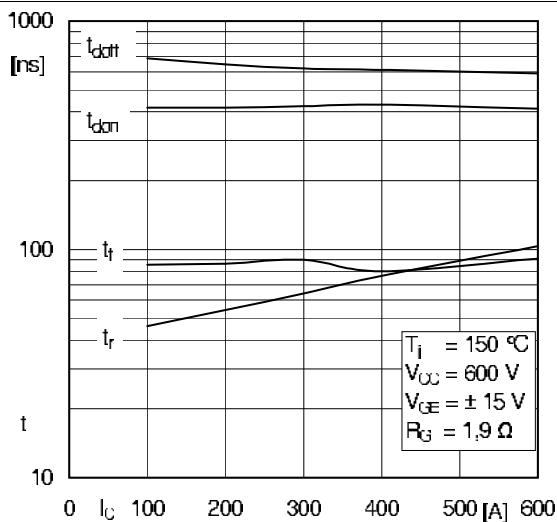


Fig. 7: Typ. switching times vs. I_C

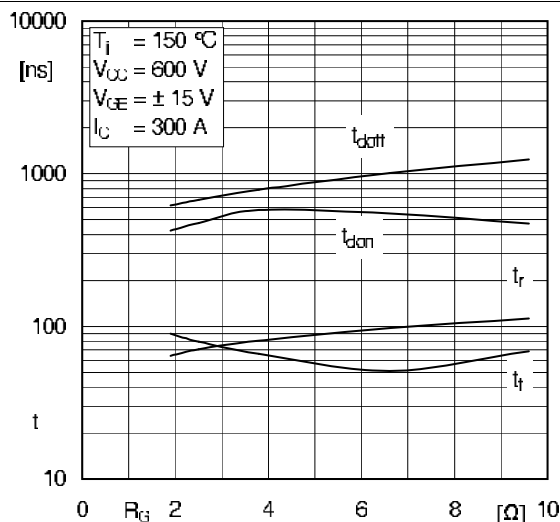


Fig. 8: Typ. switching times vs. gate resistor R_G

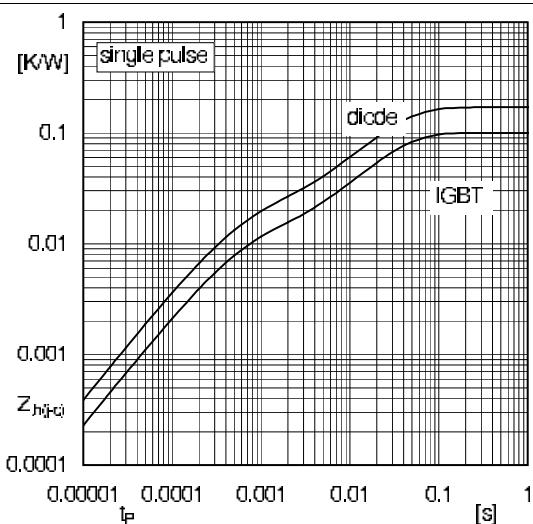


Fig. 9: Typ. transient thermal impedance

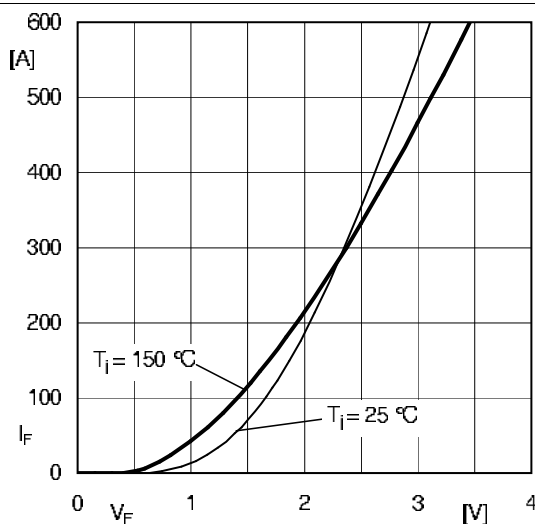


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

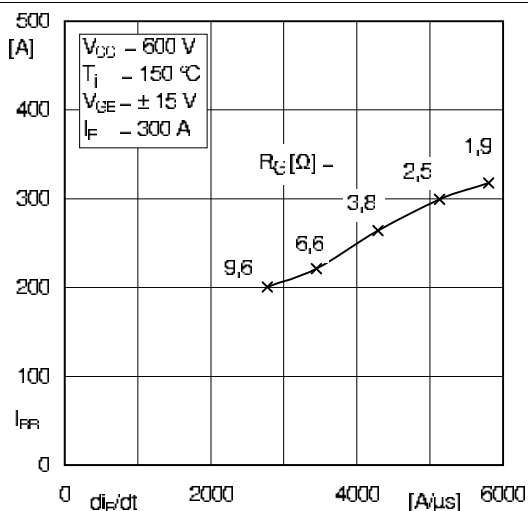


Fig. 11: Typ. CAL diode peak reverse recovery current

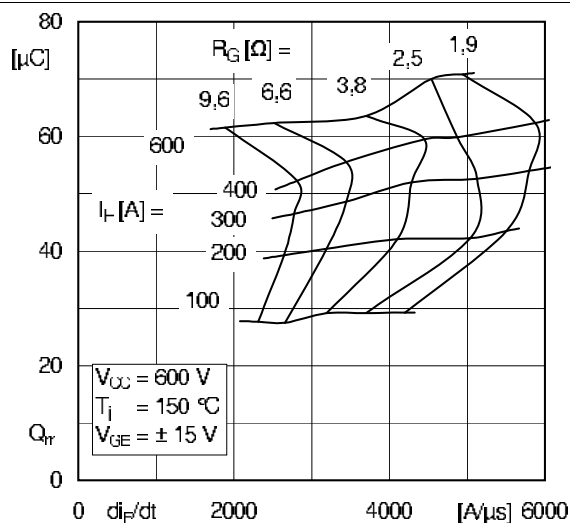
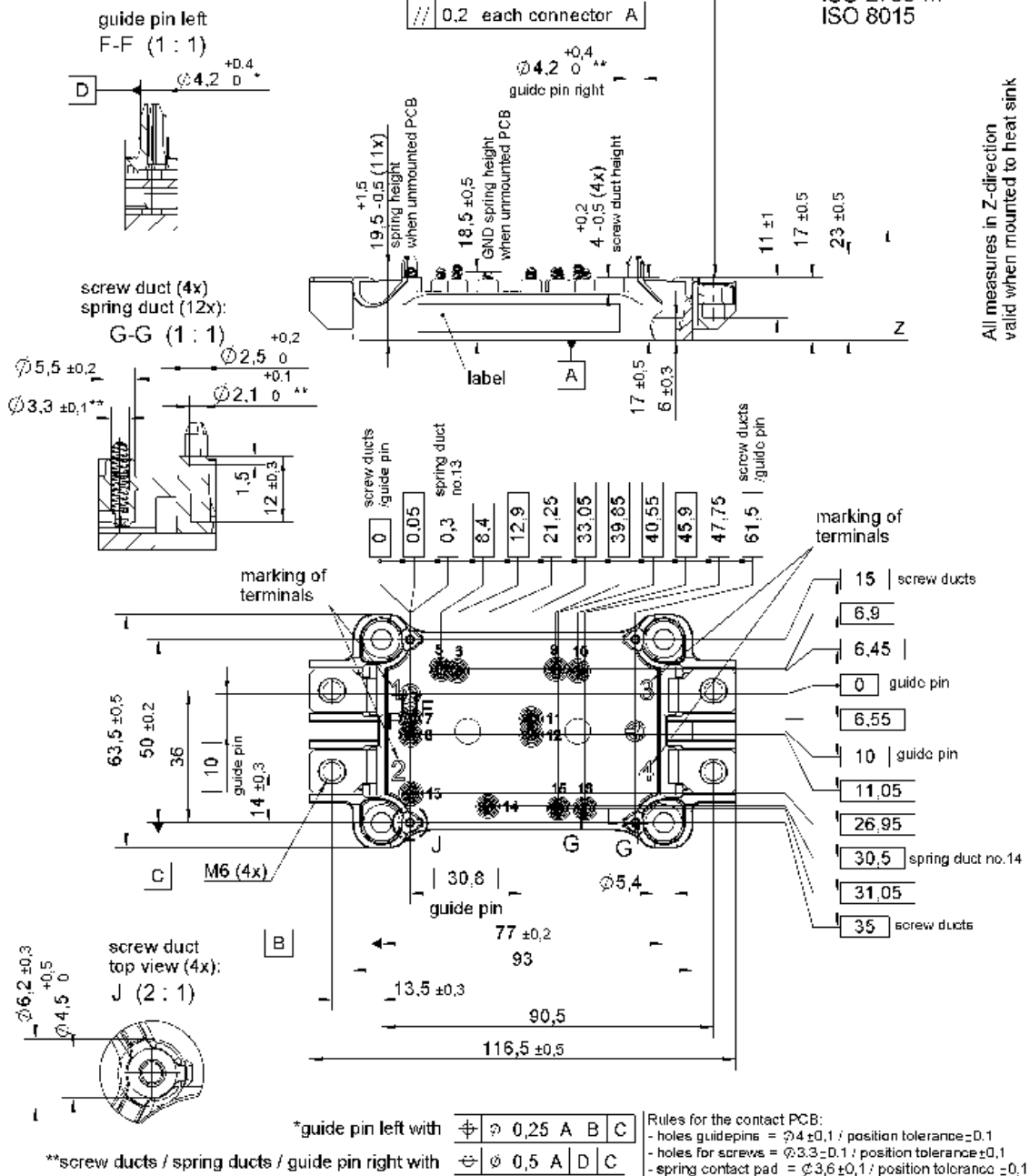
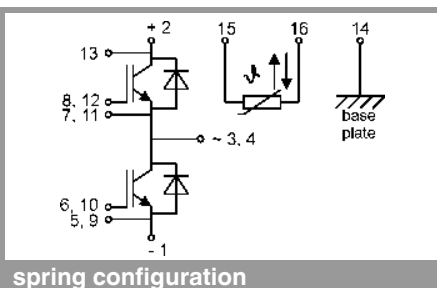


Fig. 12: Typ. CAL diode recovery charge

Case: SEMiX 2s



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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.