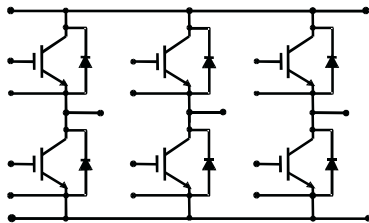


$V_{CE} = 1200\text{ V}$

$I_C = 100\text{ A}$



IGBT Module LoPak3 SPT

5SNS 0100W120100

PRELIMINARY

Doc. No. 5SYA1522-01 May. 01

- Low-loss, rugged IGBT SPT chip-set
- EMC friendly diode with positive temp. coefficient of on-state
- Low profile compact baseless package
- Industry standard package
- UL File no. E63532



Maximum Rated Values

($T_{vj} = 25^\circ\text{C}$, unless specified otherwise)

Parameter	Symbol	Conditions	Values	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE} shorted	1200	V
DC Collector Current	I_C	$T_{hs} = 70^\circ\text{C}$	100	A
Peak Collector Current	I_{CM}	Pulse: $t_p = 1\text{ms}$, $T_{hs} = 70^\circ\text{C}$	200	A
Gate Emitter Voltage	V_{GES}		± 20	V
Total Power Dissipation	P_{tot}	$T_{hs} = 25^\circ\text{C}$ per switch	450	W
IGBT Switching SOA	SwSOA	$I_C = 200\text{ A}$, $V_{CEM} = 1200\text{ V}$, $V_{CC} \leq 1000\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 125^\circ\text{C}$ voltages measured on auxiliary terminals		
IGBT Short Circuit SOA	SCSOA	$V_{CC} = 900\text{ V}$, $V_{CEM} = 1200\text{ V}$, $t_p = 10\text{ }\mu\text{s}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 125^\circ\text{C}$		
DC Forward Current	I_F		100	A
Peak Forward Current	I_{FM}	Pulse: $t_p = 1\text{ms}$, $T_{hs} = 70^\circ\text{C}$	200	A

Maximum Rated Values (cont.) ($T_{vj} = 25^{\circ}\text{C}$, unless specified otherwise)

Parameter	Symbol	Conditions	Values	Unit
Junction Temperature	T_{vj}		- 40 ~ 150	$^{\circ}\text{C}$
Storage Temperature	$T_{\text{stg}}/T_{\text{cop}}$		- 40 ~ 125	$^{\circ}\text{C}$
Isolation Voltage	V_{iso}	1 min, $f = 50\text{Hz}$	2500	V
Mounting	Base to Heatsink	(M5) Hole 5.5mm diameter	3 ~ 6	Nm
	Main Terminals	Pin: 1.15*1.0 mm		
	PCB mounting	Pitch of pins : 3.81 mm		
	Gate, Emitter Aux.	Pin: 1.15*1.0 mm		

IGBT Characteristic Values ($T_{vj} = 25^{\circ}\text{C}$, unless specified otherwise)

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}^*$	$I_{\text{C}} = 100\text{ A}$, $V_{\text{GE}} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	2.00	2.35	V
			$T_{vj} = 125^{\circ}\text{C}$	2.20		V
Collector Cut-off Current	I_{CES}	$V_{\text{CE}} = 1200\text{ V}$, $V_{\text{GE}} = 0\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$			8	mA
Gate-Emitter leakage Current	I_{GES}	$V_{\text{CE}} = 0\text{ V}$, $V_{\text{GE}} = \pm 20\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$			± 500	nA
Gate-Emitter Threshold Voltage	$V_{\text{GE(To)}}$	$I_{\text{C}} = 4\text{ mA}$, $V_{\text{CE}} = V_{\text{GE}}$	4.5		6.5	V
Total Gate Charge	Q_{ge}	$I_{\text{C}} = 100\text{ A}$, $V_{\text{CE}} = 600\text{ V}$, $V_{\text{GE}} = -15\text{ to }15\text{ V}$		1000		nC
Input Capacitance	C_{ies}	$V_{\text{CE}} = 25\text{ V}$, $V_{\text{GE}} = 0\text{ V}$, $f = 1\text{MHz}$		9.0		nF
Output Capacitance	C_{oes}			2.2		nF
Reverse Transfer Capacitance	C_{res}			1.8		nF
Turn-On Delay Time	$t_{\text{d(on)}}$	$I_{\text{C}} = 100\text{ A}$, $V_{\text{CC}} = 600\text{ V}$, $R_{\text{gon}} = 10\ \Omega$, $T_{vj} = 125^{\circ}\text{C}$, $V_{\text{GE}} = \pm 15\text{ V}$		0.08		μs
Rise Time	t_{r}			0.06		μs
Turn-Off Delay Time	$t_{\text{d(off)}}$	$I_{\text{C}} = 100\text{ A}$, $V_{\text{CC}} = 600\text{ V}$, $R_{\text{goff}} = 10\ \Omega$, $T_{vj} = 125^{\circ}\text{C}$, $V_{\text{GE}} = \pm 15\text{ V}$		0.5		μs
Fall Time	t_{f}			0.09		μs
Turn-on Switching Energy	E_{on}	$R_{\text{gon}} = 10\ \Omega$ $I_{\text{C}} = 100\text{ A}$, $T_{vj} = 125^{\circ}\text{C}$, $V_{\text{CC}} = 600\text{ V}$, $V_{\text{GE}} = \pm 15\text{ V}$, inductive load, integrated up to: 3% $V_{\text{CE}} (E_{\text{on}})$, 1% $I_{\text{C}} (E_{\text{off}})$		11.0		mJ
Turn-off Switching Energy	E_{off}			9.5		mJ
Module stray Inductance Plus to Minus	$L_{\text{s DC}}$				25	nH
Resistance terminal-chip	$R_{\text{CC'+EE'}}$	$T_{\text{hs}} = 25^{\circ}\text{C}$		1.25		m Ω
		$T_{\text{hs}} = 125^{\circ}\text{C}$		1.90		

* Note 1: Collector emitter saturation voltage is given at die level.

Diode Characteristic Values(T_{vj} = 25 °C, unless specified otherwise)

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Forward Voltage	V _F *	I _F = 100 A T _{vj} = 25 °C T _{vj} = 125 °C		2.00 2.00	2.40	V
Reverse Recovery Current	I _{rrm}	I _F = 100 A, R _{gon} = 10 Ω, V _{CC} = 600 V, V _{GE} = ±15 V, T _{vj} = 125 °C		120		A
Reverse Recovery Charge	Q _{rr}			20		μC
Reverse Recovery Time	t _{rr}			0.30		μs
Reverse Recovery Energy	E _{rec}	I _F = 100 A, T _{vj} = 125 °C, V _{CC} = 600V, R _{gon} = 10 Ω, V _{GE} = ±15 V, inductive load, fully integrated		8.5		mJ
Resistance terminal-chip	R _{CC'+EE'}	T _{hs} = 25 °C T _{hs} = 125 °C		1.25 1.90		mΩ

* Note 2: Forward voltage is given at die level

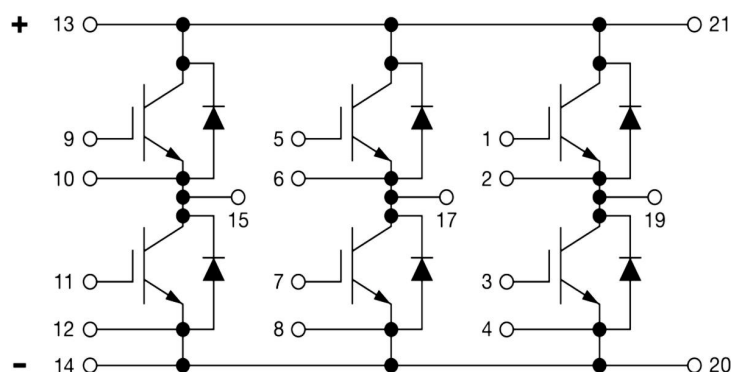
Thermal Characteristics(T_j = 25 °C, unless specified otherwise)

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
IGBT Thermal Resistance Junction to Heatsink	R _{th j-h Igbt}	Heatsink: flatness < +/- 20 μm, roughness < 6 μm without ridge Thermal grease: thickness: 30 μm < t < 50 μm			0.280	°C/W
Diode Thermal Resistance Junction to Heatsink	R _{th j-h Diode}				0.560	°C/W
Equivalent IGBT Thermal Resistance Junct. to Case	R _{th j-c Igbt}				0.180	°C/W
Equivalent Diode Thermal Resistance Junct. to Case	R _{th j-c Diode}				0.360	°C/W

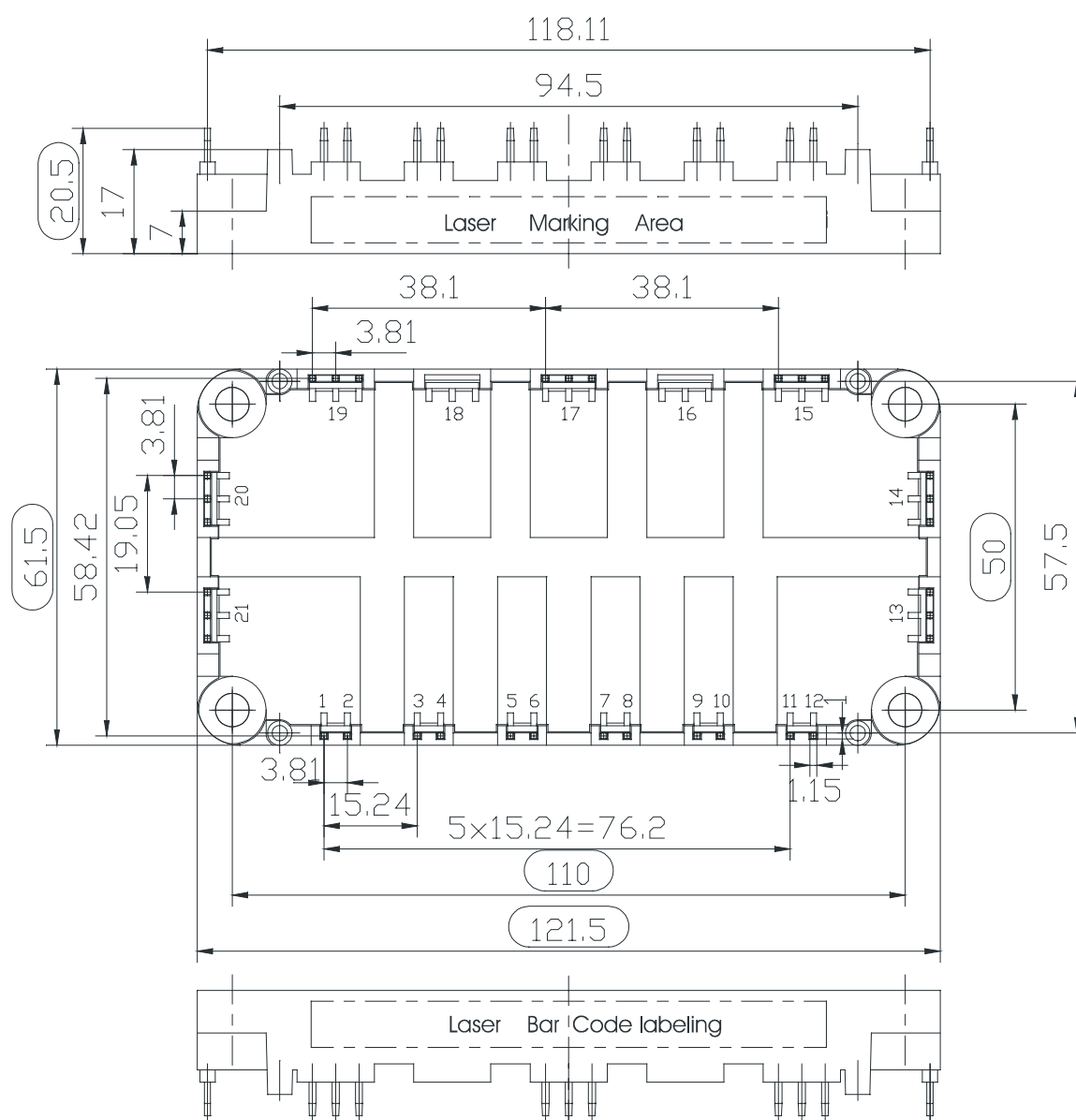
Mechanical Properties

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Dimensions	L * W * H	Typical , see outline drawing	121.5 * 61.5 * 20.5			mm
Clearance Distance	D _C	acc. IEC 664-1 and prEN50124-1:1995 Term. to base:	8.5			mm
		Term. to term:	9.5			mm
Surface Creepage Distance	D _{SC}	acc. IEC 664-1 and prEN50124-1:1995 Term. to base:	12.5			mm
		Term. to term:	15.5			mm
Weight				215		gr

Electrical configuration



Outline drawing



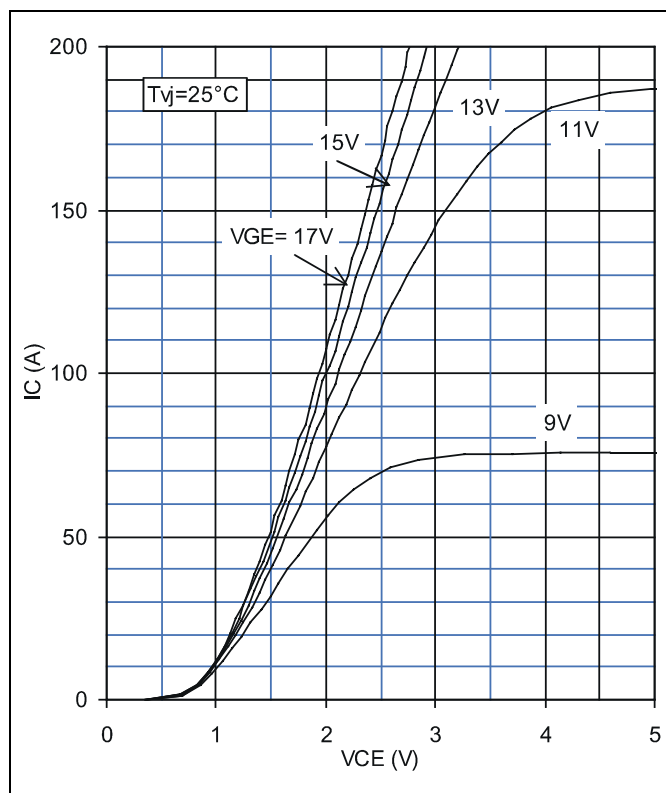


Fig. 1 Typ. Output Characteristics
at $T_j=25^\circ\text{C}$

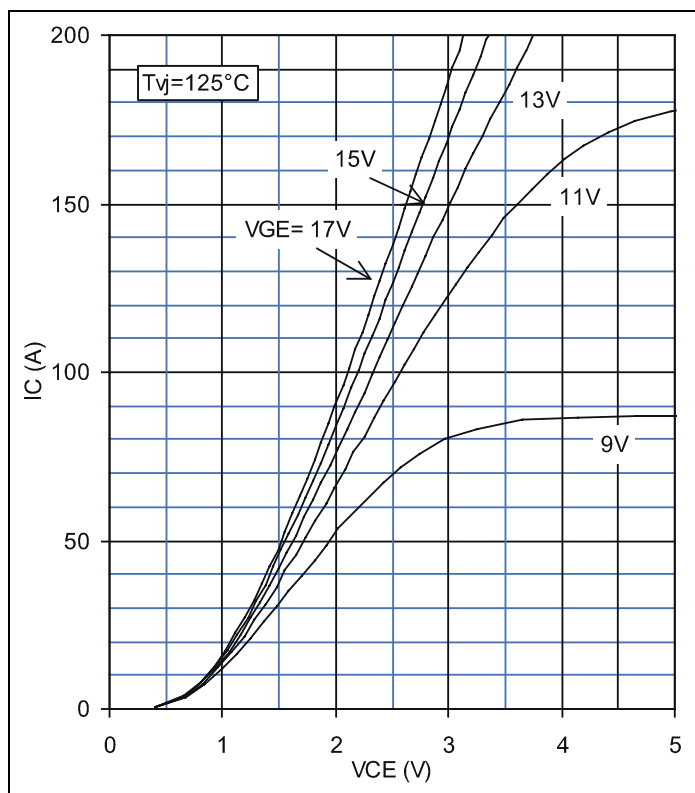


Fig. 2 Typ. Output Characteristics
at $T_j=125^\circ\text{C}$

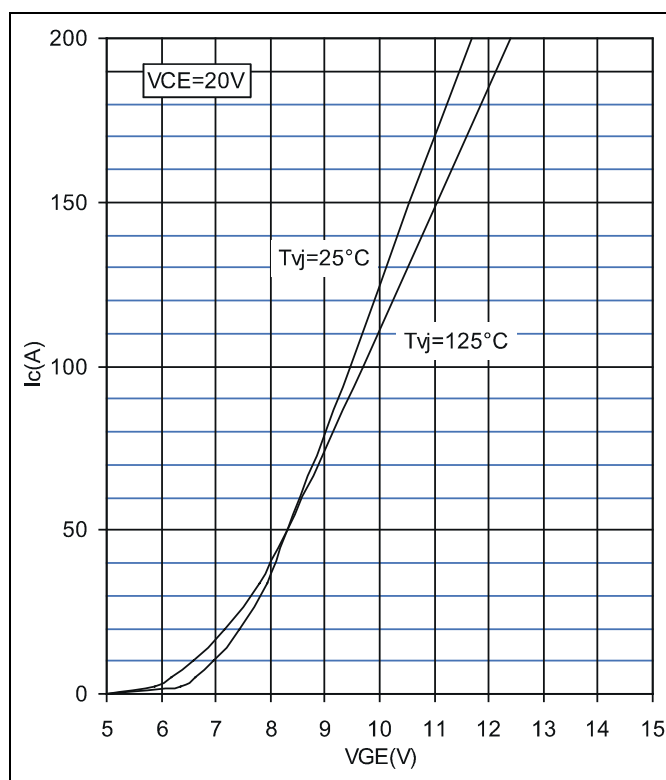


Fig. 3 Typ. Transfer Characteristics

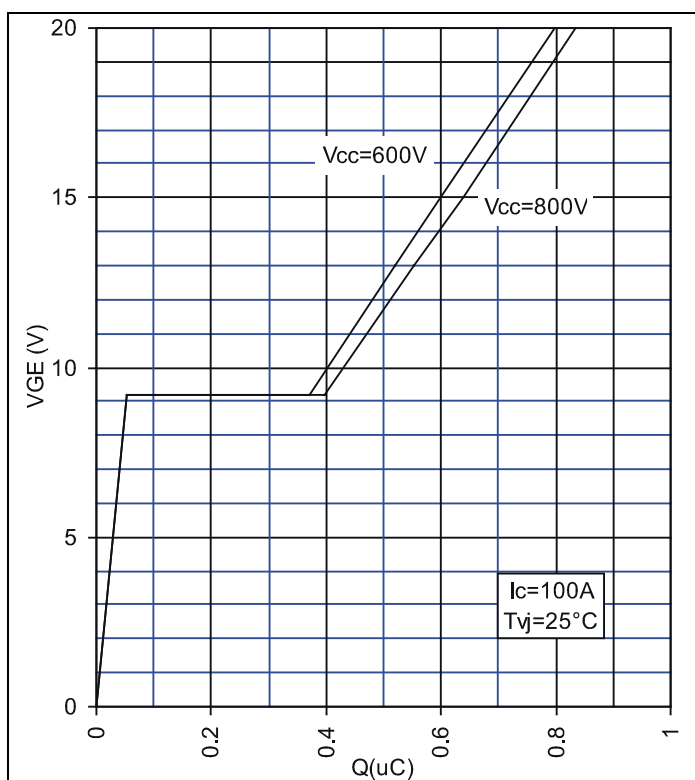


Fig. 4 Typ. Gate charge Characteristics

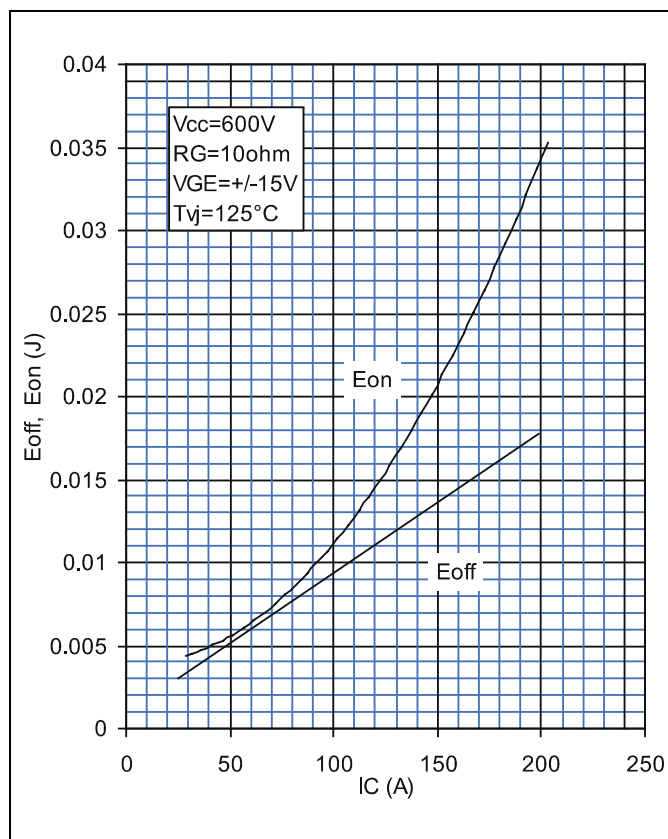


Fig. 5 Typ. Switching Energies per pulse vs on-state current

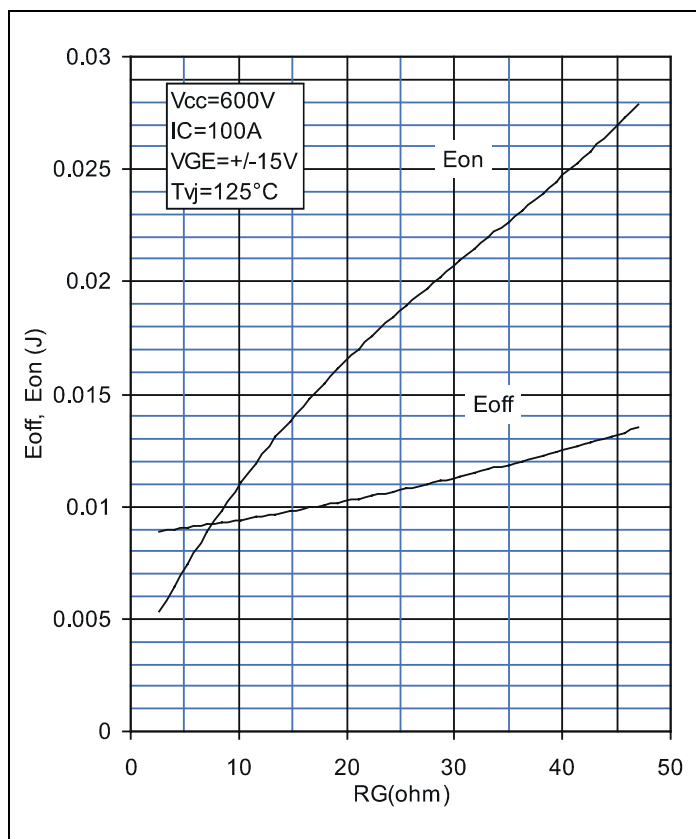


Fig. 6 Typ. Switching Energies per pulse vs gate resistor

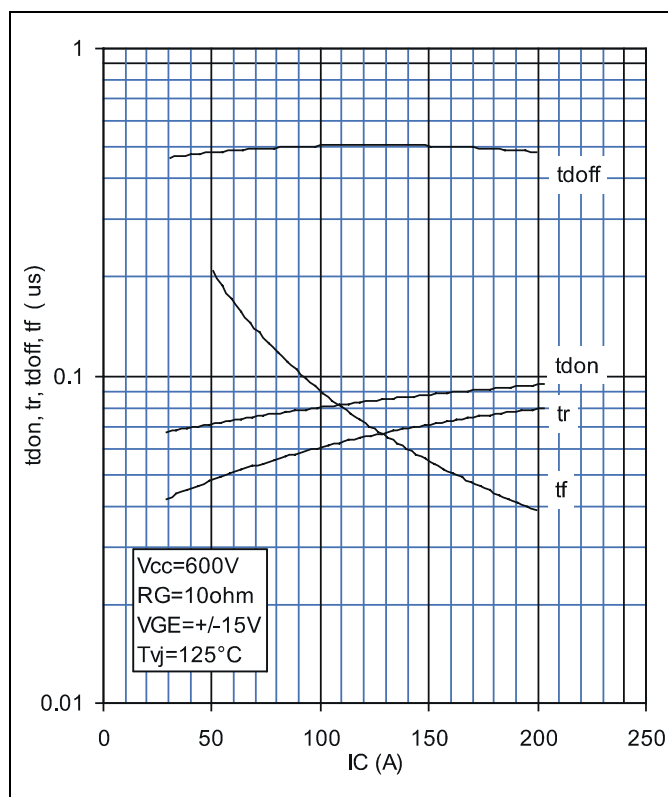


Fig. 7 Typ. Switching times vs on-state current

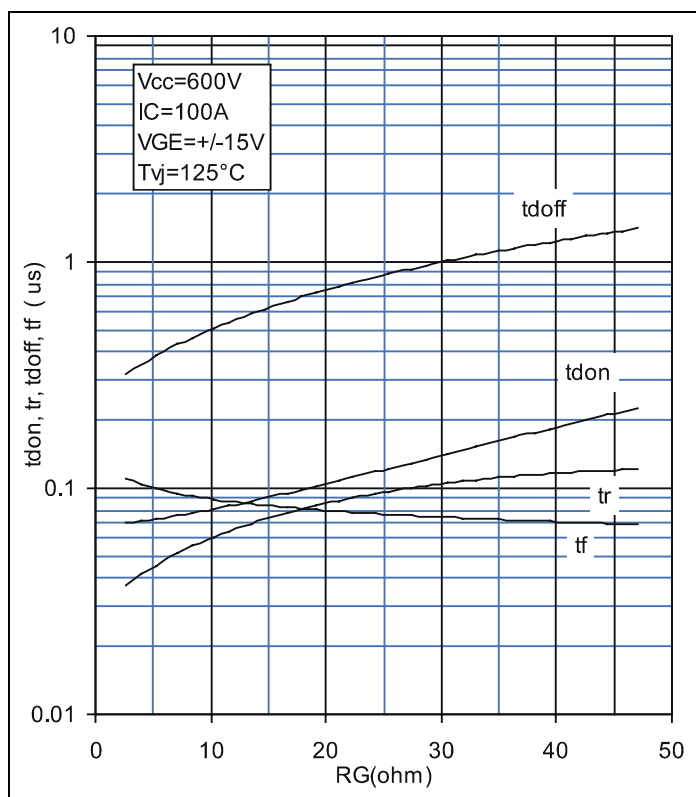


Fig. 8 Typ. Switching times vs gate resistor

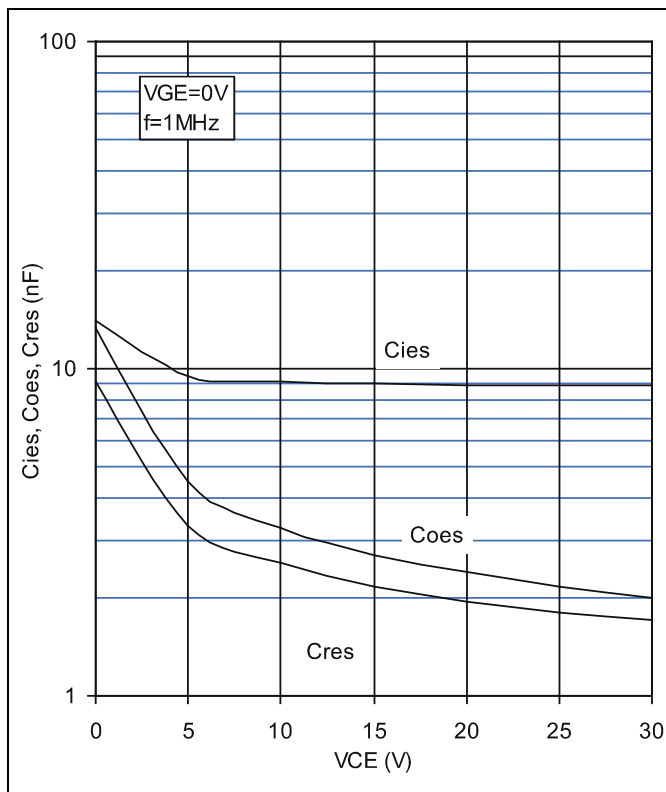


Fig. 9 Typ. Capacitances vs collector-emitter Voltage

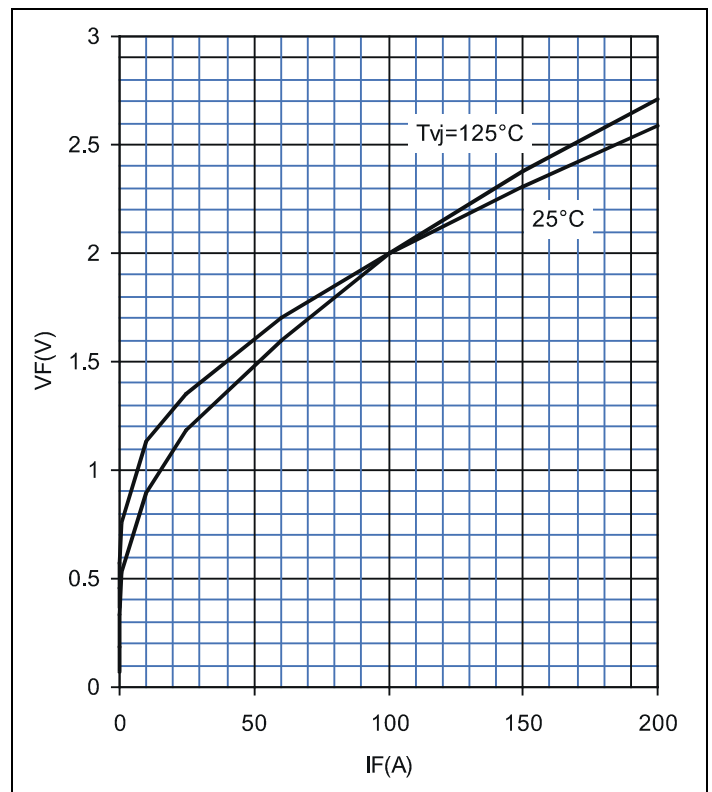


Fig. 10 Typ. Diode forward Characteristics

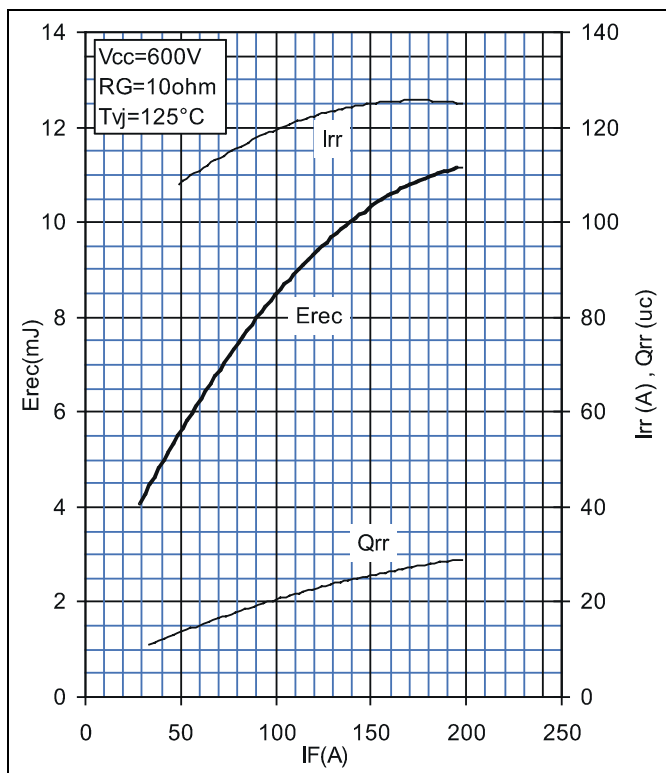


Fig. 11 Typ. Reverse Recovery Characteristics vs forward current

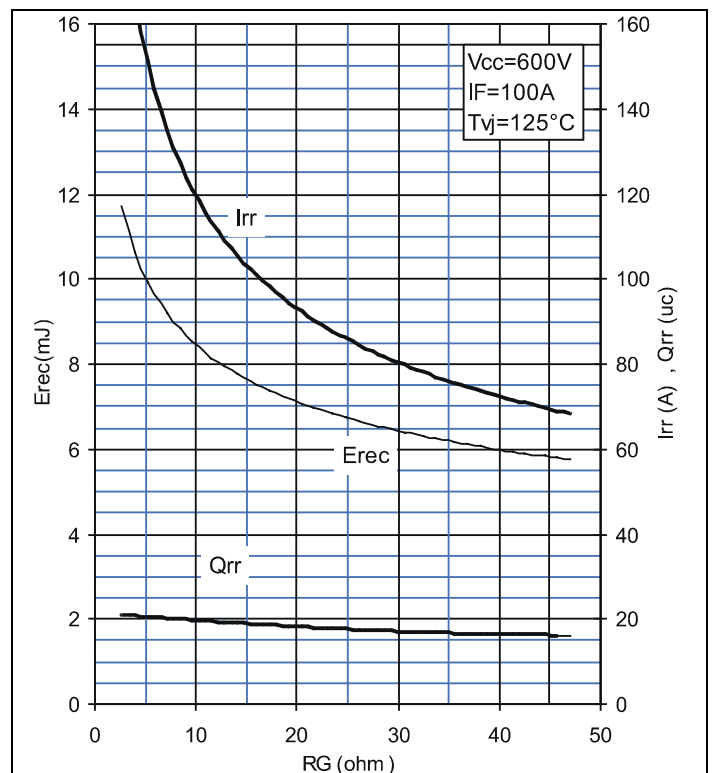


Fig. 12 Typ. Reverse Recovery Characteristics vs gate resistor

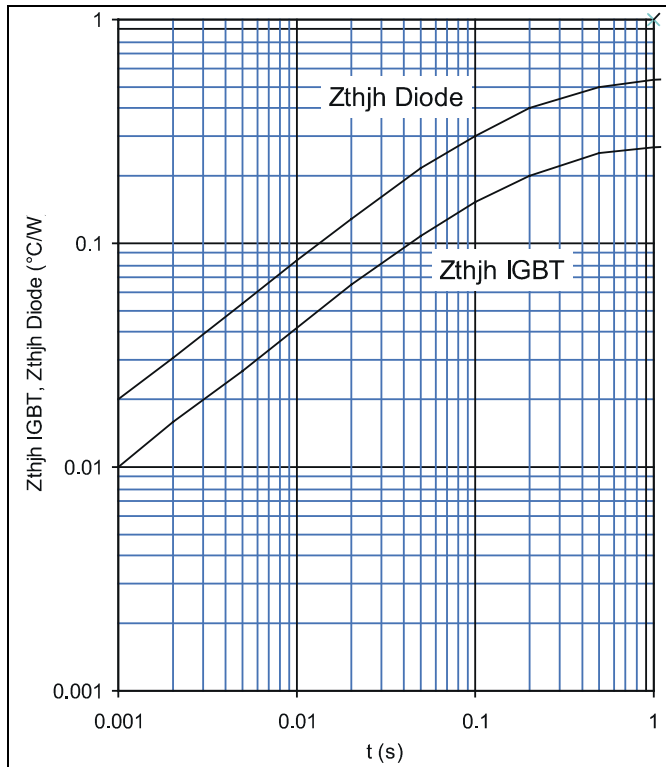


Fig. 13 Typ. Thermal impedance vs time

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