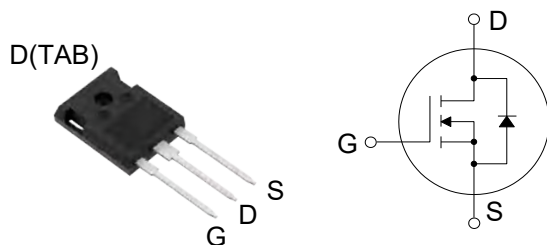


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G=Gate,D=Drain, S=Source, TAB=Drain

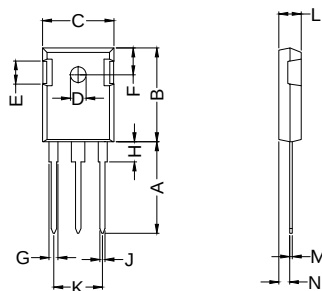
V_{DS} : 1200V

I_D : 40A@25°C

$R_{DS(ON)}$: 60mΩ

N Channel Enhancement Mode

Dimensions TO-247AD



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.620	0.640
ØD	3.15	3.65	0.124	0.144
E	4.32	5.49	0.170	0.216
F	5.40	6.30	0.213	0.248
G	1.65	2.18	0.065	0.086
H	3.80	4.50	0.150	0.177
J	1.00	1.40	0.039	0.055
K	10.80	11.10	0.425	0.437
L	4.70	5.30	0.185	0.209
M	0.40	0.80	0.016	0.031
N	1.50	2.49	0.059	0.098

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		1200	V
V_{GS}	Gate to Source Voltage (DC)		-10 / +25	V
V_{GSop}	Recommended Operation Value		-5 / +20	V
I_D	Drain Current	Continuous ($T_C = 25^\circ\text{C}$)	40	A
		Continuous ($T_C = 100^\circ\text{C}$)	28	
I_{DM}	Drain Current	Pulsed (Note1)	80	A
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	220	W
		Derate Above 25°C	2.40	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 175	°C
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds		260	°C

※Note 1 : Limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.69	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	40	

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Electrical Characteristics (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV _{DSS}	Drain to Source Breakdown Voltage	V _{GS} = 0 V, I _D = 0.1 mA	1200			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 1200 V, V _{GS} = 0 V		1	100	μA
		V _{DS} = 1200 V, V _{GS} = 0 V, T _J = 175°C		10		
I _{GSS}	Gate-Source Leakage Current	V _{GS} = +22 V, V _{DS} = 0 V			+100	nA
		V _{GS} = -10 V, V _{DS} = 0 V			-100	

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 10 mA	2.0	3.0	4.5	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 18 V, I _D = 20 A		60	76	mΩ
		V _{GS} = 18 V, I _D = 20 A, T _J = 175°C		117		
g _{fs}	Transconductance	V _{DS} = 20 V, I _D = 20 A		10.2		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 800 V, V _{GS} = 0V, f = 1 MHz		940		pF
C _{oss}	Output Capacitance			60		
C _{rss}	Reverse Capacitance			4		
E _{oss}	Stored Energy in Output Capacitance	V _{DS} = 0 V to 800 V, V _{GS} = 0 V		25		μJ
C _{o(er)}	Energy Related Output Capacitance			77		pF
C _{o(tr)}	Time Related Output Capacitance			140		
Q _{g(tot)}	Total Gate Charge	V _{DS} = 800 V, I _D = 20 A, V _{GS} = -5 V / 18 V, Inductive load		51		nC
Q _{gs}	Gate to Source Charge			8		
Q _{gd}	Gate to Drain "Miller" Charge			20		
R _G	Internal Gate Resistance	f = 1MHz, V _{AC} =30mV		1.6		Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{DS} = 800 V, I _D = 30 A, V _{GS} = -5 V / 18 V, R _G = 2 Ω, Inductive load		21		ns
t _r	Turn-On Rise Time			22		
t _{d(off)}	Turn-Off Delay Time			16		
t _f	Turn-Off Fall Time			18		
E _{on}	Turn-on Switching Energy			322		μJ
E _{off}	Turn-off Switching Energy			46		
E _{tot}	Total Switching Energy			368		

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Source-Drain Diode Characteristics

I_S	Maximum Continuous Diode Forward Current			40	A
I_{SM}	Maximum Pulsed Diode Forward Current			78	
V_{SD}	Diode Forward Voltage	$V_{GS} = -4\text{ V}, I_{SD} = 10\text{ A}$		4.2	V
t_{rr}	Reverse Recovery Time	$V_{DD} = 800\text{ V}, I_{SD} = 20\text{ A},$ $di_F/dt = 1000\text{ A}/\mu\text{s}$, Includes Q_{oss}		43	ns
Q_{rr}	Reverse Recovery Charge			412	nC

FEATURES

- * Low on-resistance
- * Fast switching speed
- * Fast reverse recovery
- * Easy to parallel
- * Simple to drive
- * Pb-free lead plating
- * RoHS compliant

APPLICATIONS

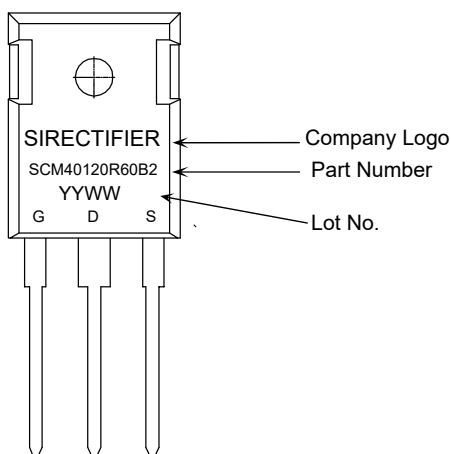
- * Solar inverter
- * EV charging station
- * UPS
- * Industrial power supply

MECHANICAL DATA

- * Case: TO-247-4L molded plastic
- * Polarity: As marked on the body
- * Weight: 6.5 grams
- * Mounting position: Any



MARKING



ORDERING INFORMATION

Part Number	Package	Shipping	Marking Code
SCM40120R60B2	TO-247AD	30pcs / Tube	SCM40120R60B2

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SiC Power MOSFET Discretes

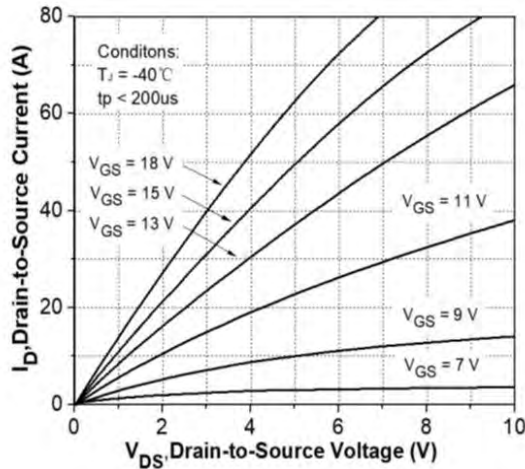


Fig 1. Output Characteristic ($T_J = -40^\circ\text{C}$)

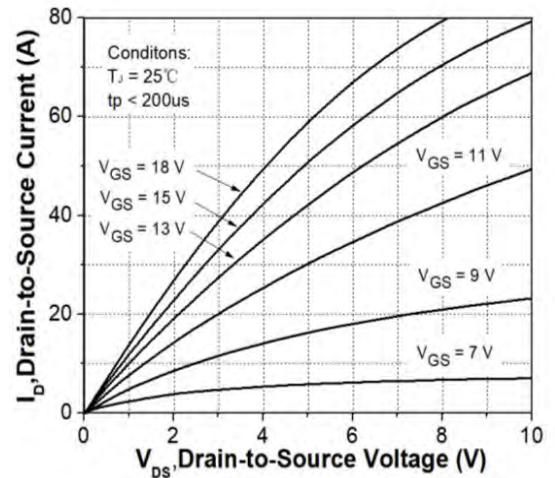


Fig 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

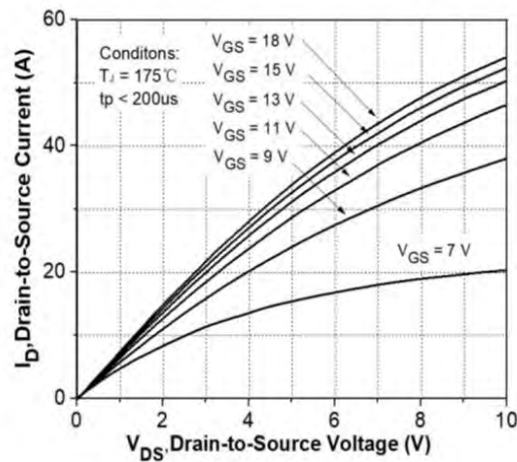


Fig 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

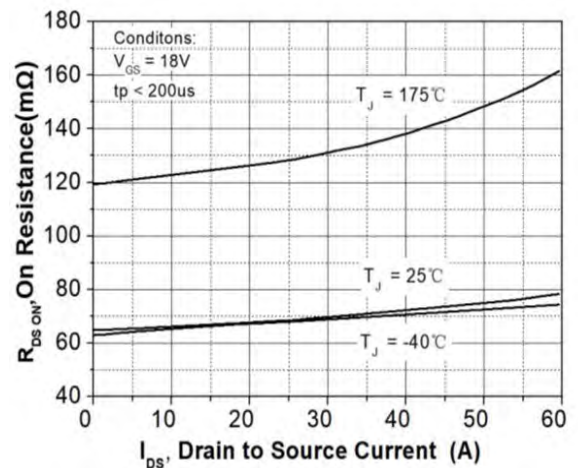


Fig 4: $R_{DS(on)}$ Vs I_{DS} Characteristic

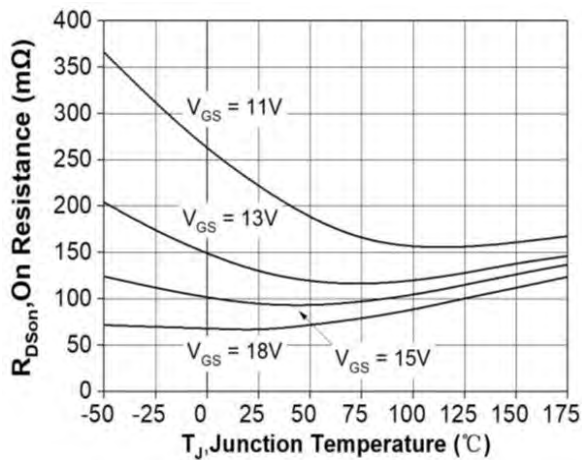


Fig 5: $R_{DS(on)}$ vs. Temperature

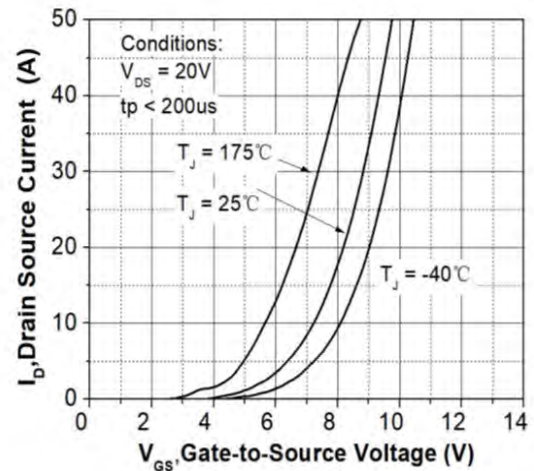


Fig 6: Transfer Characteristic

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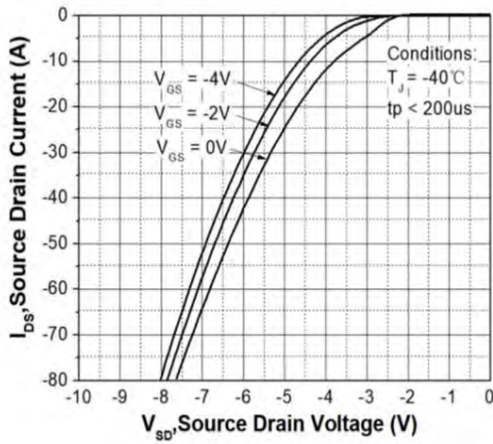


Fig 7: Body-diode Characteristic ($T_J = -40^\circ\text{C}$)

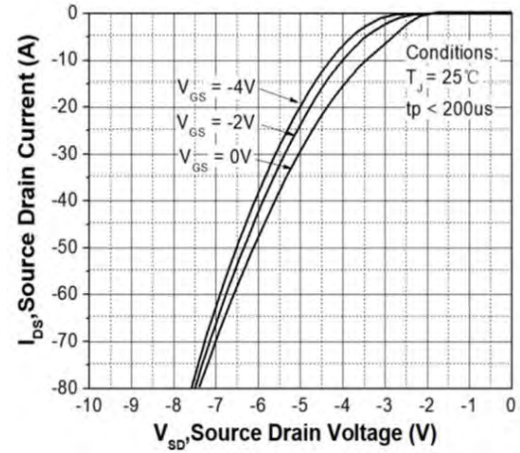


Fig 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

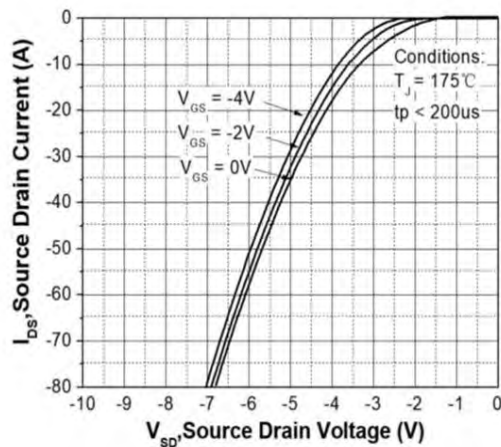


Fig 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

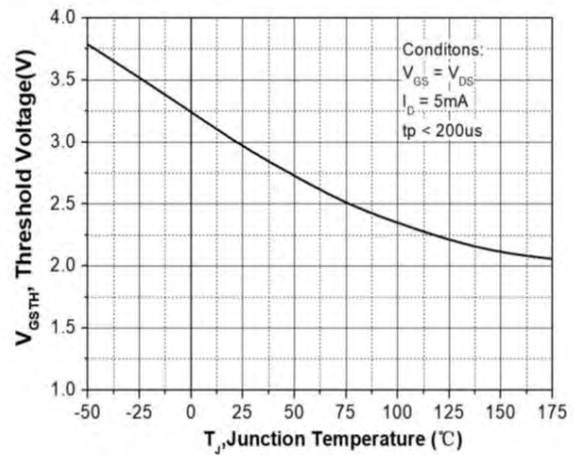


Fig 10: V_{TH} Vs T_J Temperature Characteristic

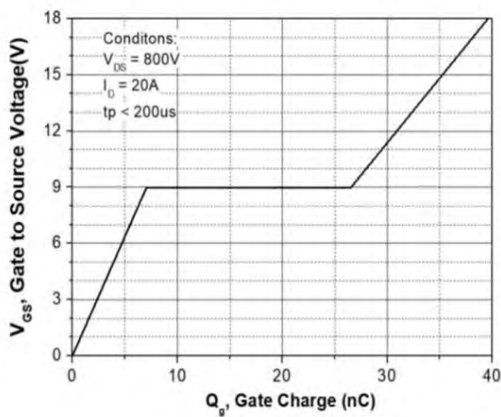


Fig 11: Gate Charge Characteristics

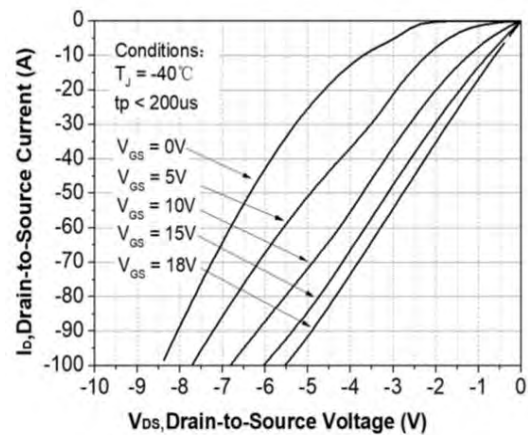


Fig 12: 3rd Quadrant Characteristic ($T_J = -40^\circ\text{C}$)

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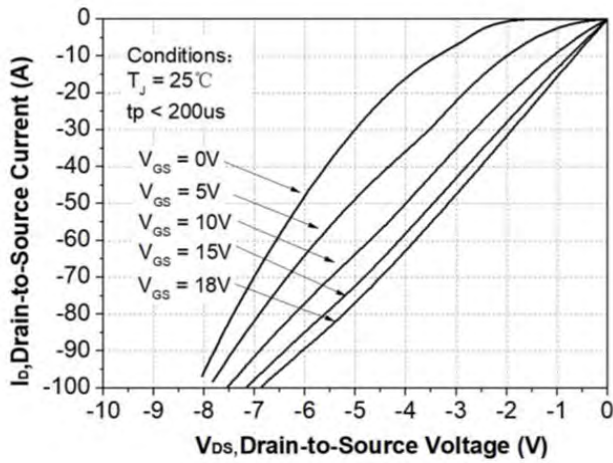


Fig 13: 3rd Quadrant Characteristic($T_J=25^\circ\text{C}$)

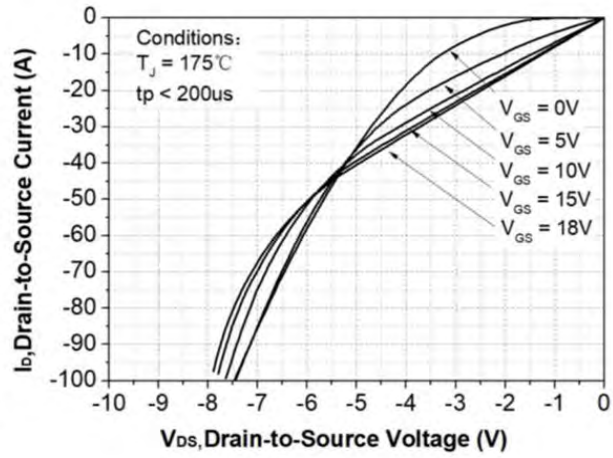


Fig 14: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

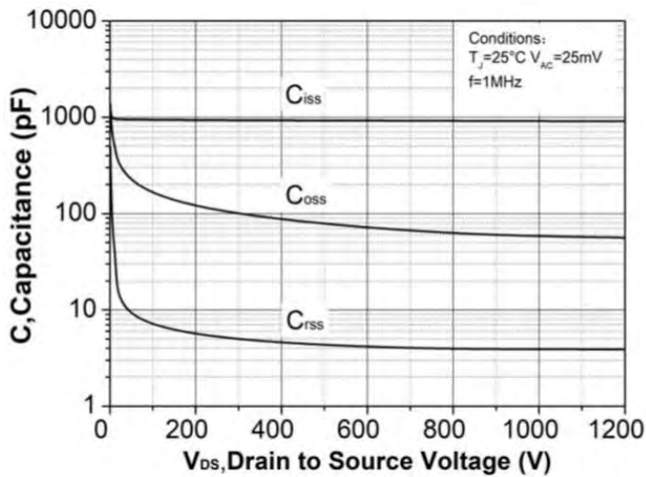


Fig 15: Capacitance Characteristic

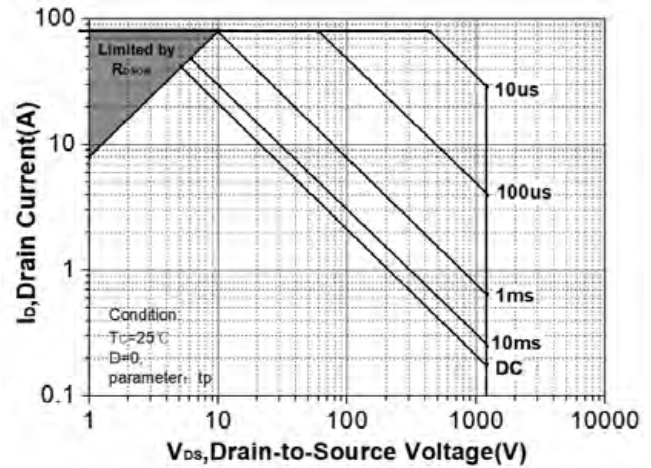


Fig 16: Safe Operating Area

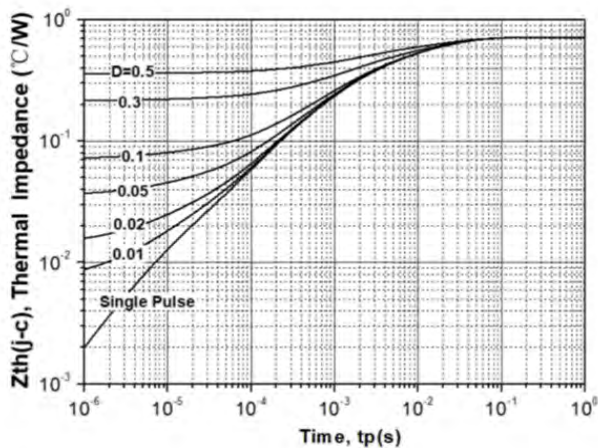


Fig 17: Transient Thermal Impedance

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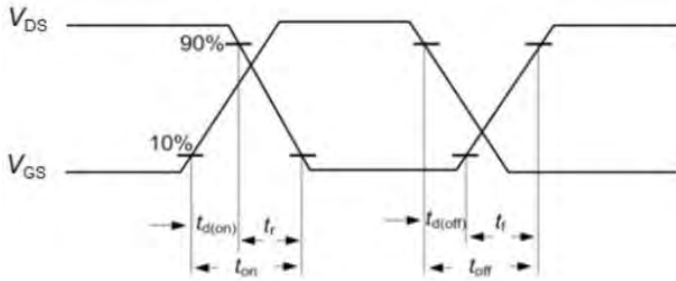


Figure A. Definition of switching times

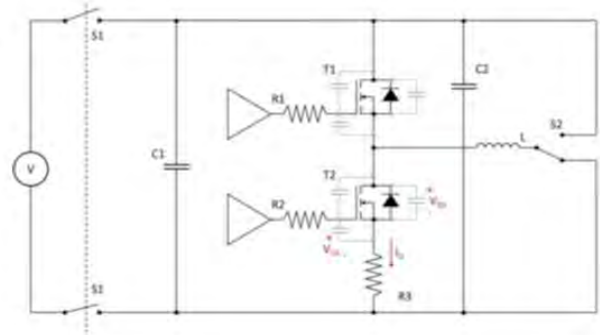


Figure B. Dynamic test circuit

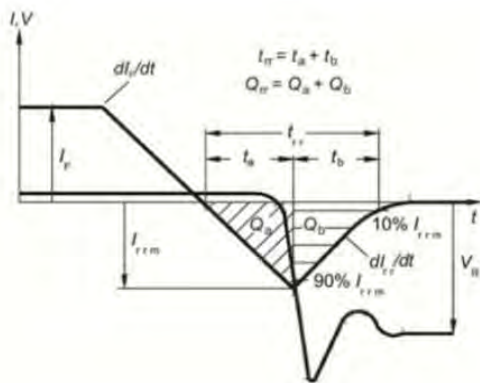


Figure C. Definition of body diodeswitching characteristics