

Product Summary

$V_{DS} = 1200\text{ V}$
 $I_D@100^\circ\text{C} = 256\text{ A}$
 $R_{DS(ON)} = 5\text{ m}\Omega$



62mm x 106mm x 30mm

Features

- High Blocking Voltage
- High Frequency Operation
- Low on-resistance
- Built-in SiC diode with zero reverse recover current
- Temperature Independent Switching Behavior
- Copper baseplate with aluminum nitride insulator

Benefits

- Higher System Efficiency
- Reduce System size and weight
- High Temperature Application
- Hard Switching & Higher Reliability
- Easy to drive

Applications

- Motor & Traction Drives
- Solar / Wind Inverters
- Induction heating
- AC/DC converters
- Vehicle Fast Charger
- Uninterruptable power supplies

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

Parameter	Symbol	Test conditions	Value	Unit
Drain - Source Voltage	V_{DSmax}	$V_{GS}=0\text{V}, I_D=2\text{mA}$	1200	V
Gate - Source Voltage (dynamic)	V_{GSmax}	AC ($f>1\text{ Hz}$)	-10 / +25	V
Gate - Source Voltage (static)	V_{GSop}	static	-5 / +20	V
Continuous MOSFET Drain Current	I_D	$V_{GS} = 20\text{V}, T_C=25^\circ\text{C}$ $V_{GS} = 20\text{V}, T_C=85^\circ\text{C}$	405 292	A
Pulsed MOSFET Drain Current	$I_{D(pulse)}$	$V_{GS} = 20\text{V}, T_C=25^\circ\text{C}$	890	A
Continuous Diode Forward Current	I_F	$V_{GS} = -5\text{V}, T_C=25^\circ\text{C}$ $V_{GS} = -5\text{V}, T_C=100^\circ\text{C}$	500 300	A
Total power dissipation	P_D	$T_C=25^\circ\text{C}, T_J=150^\circ\text{C}$	1666	W
Operating Junction Temperature	T_J		-40 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}		-40 to 150	$^\circ\text{C}$
Case Isolation Voltage	V_{isol}	AC, 50Hz, 1min	2.5	KV

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 2mA$	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 15mA$	1.1	1.8		V
		$V_{DS} = V_{GS}, I_D = 15mA, T_J = 150^\circ\text{C}$		1.25		V
		$V_{DS} = V_{GS}, I_D = 15mA, T_J = 175^\circ\text{C}$		1.17		
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 1200V, V_{GS} = 0V$		500	1500	μA
		$V_{DS} = 1200V, V_{GS} = 0V, T_J = 150^\circ\text{C}$		2000		
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = 20V, V_{DS} = 0V$		10	100	nA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = -5V, V_{DS} = 0V$	-500	-50	0	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 20V, I_D = 300A$		5	6.5	m Ω
		$V_{GS} = 20V, I_D = 300A, T_J = 150^\circ\text{C}$		8.6		
Transconductance	g_{fs}	$V_{DS} = 20V, I_D = 300A,$		129		S
		$V_{DS} = 20V, I_D = 300A, T_J = 150^\circ\text{C}$		112		
Input capacitance	C_{iss}	$V_{DS} = 600V, V_{GS} = 0V$ $f = 200\text{KHz}, V_{ac} = 25\text{mV}$		19		nF
Output capacitance	C_{oss}			2.68		
Reverse transfer capacitance	C_{rss}			0.09		
Total gate charge	Q_g	$V_{DS} = 600V,$ $V_{GS} = -5V/20V$ $I_D = 280A,$		1238		nC
Gate-source charge	Q_{gs}			440		
Gate-drain charge	Q_{gd}			480		
Internal gate input resistance	$R_{g(int)}$	$f = 1\text{MHz}, I_D = 0A,$ $V_{AC}=25\text{mV}$		2.9		Ω
Turn-On Switching Energy (Body Diode FWD)	E_{ON}	$V_{DS} = 600V, V_{GS} = -5V/20V,$ $I_D = 300A, R_{G(ext)} = 2\Omega,$ $L=37.5\mu\text{H}$		9		mJ
Turn-Off Switching Energy (Body Diode FWD)	E_{OFF}			7.4		
Turn-On Delay Time	$t_{d(on)}$			92		ns
Rise Time	t_r			96		
Turn-Off Delay Time	$t_{d(off)}$			214		
Fall Time	t_f			48		

Reverse Diode Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode Forward Voltage	V_{SD}	$V_{GS} = -5V, I_{SD} = 300A,$		1.4	1.9	V
		$V_{GS} = -5V, I_{SD} = 300A, T_J = 150^\circ\text{C}$		1.7		
Reverse Recovery Charge	Q_{RR}	$V_{GS} = -5V, I_{SD} = 300A,$ $V_R = 600V, dif/dt = 600A/\mu\text{s}$		TBD		μC
Peak Reverse Recovery Current	I_{RR}			TBD		A
Reverse Recovery Time	t_{RR}				TBD	ns

Thermal Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Thermal Resistance for MOSFET	$R_{th(j-c)M}$	junction-case		0.07	0.075	$^{\circ}C/W$
Thermal Resistance for Diode	$R_{th(j-c)M}$	junction-case		0.075	0.08	$^{\circ}C/W$

Typical Performance

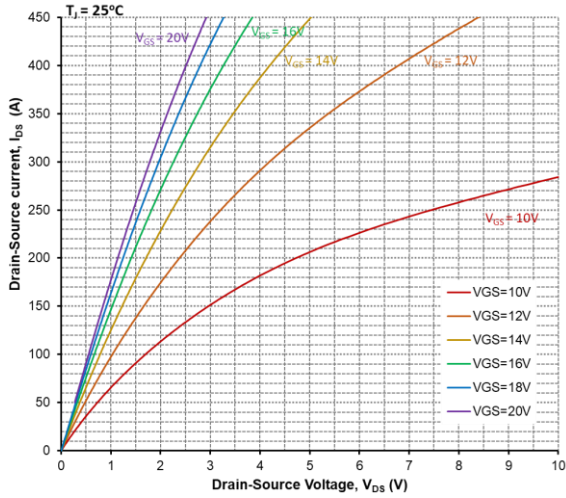


Figure 1. Output Characteristics, $T_J = 25^\circ\text{C}$

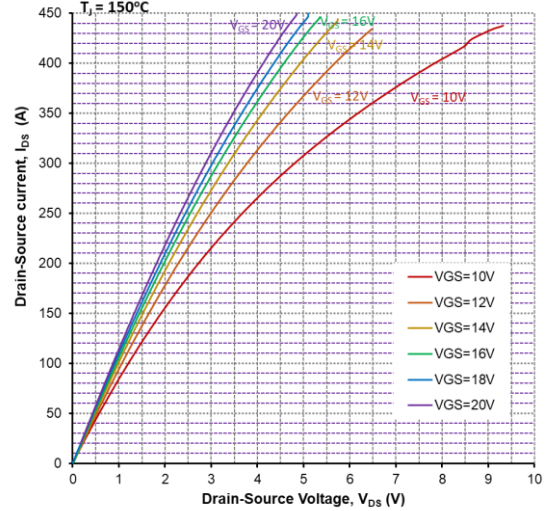


Figure 2. Output Characteristics, $T_J = 150^\circ\text{C}$

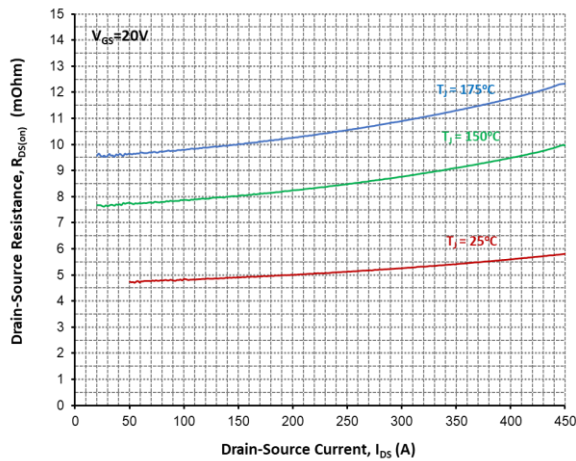


Figure 3. On-Resistance vs. Drain Current For Various Temperatures

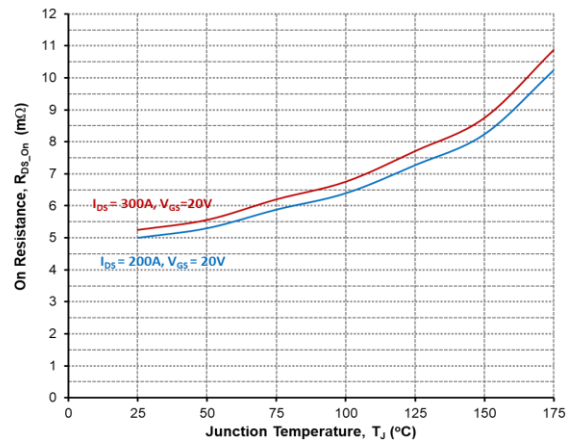


Figure 4. On-Resistance vs. Temperature

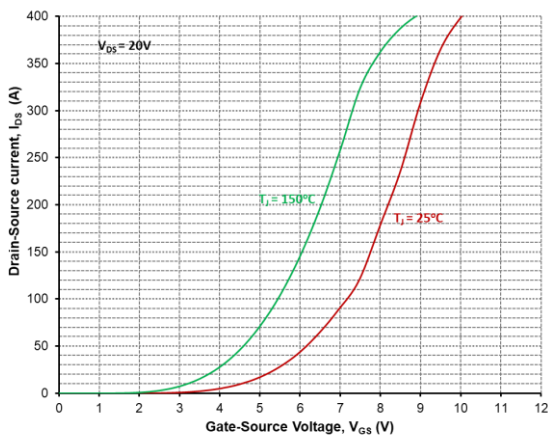


Figure 5. Transfer Characteristic For Various Junction Temperatures

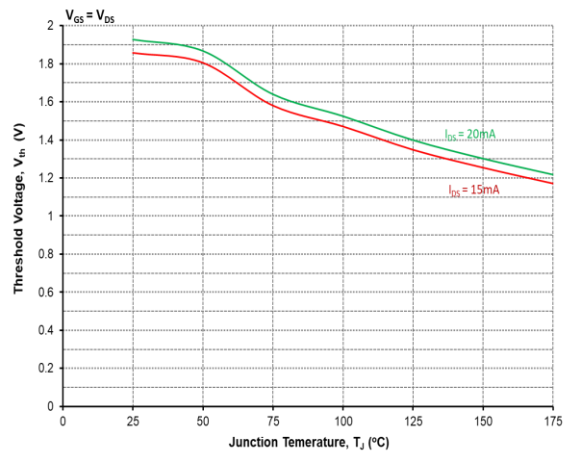


Figure 6. Threshold Voltage vs. Temperature

Typical Performance

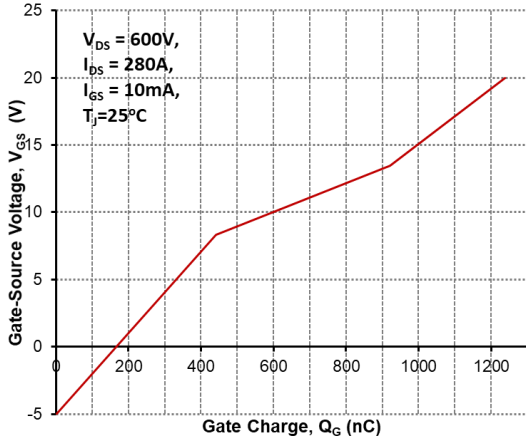


Figure 7. Gate Charge Characteristics

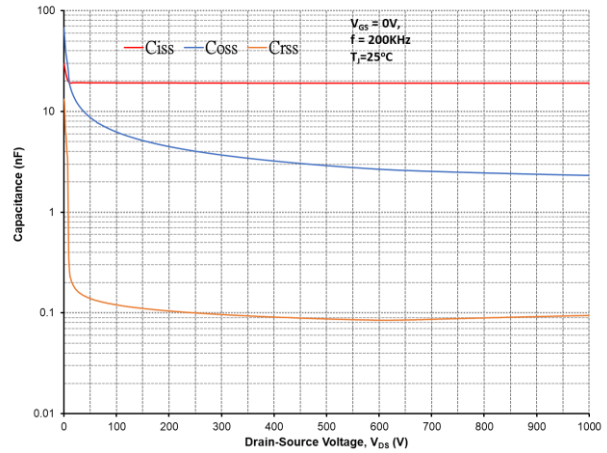


Figure 8. Capacitances vs. Drain-Source Voltage (0-1000V)

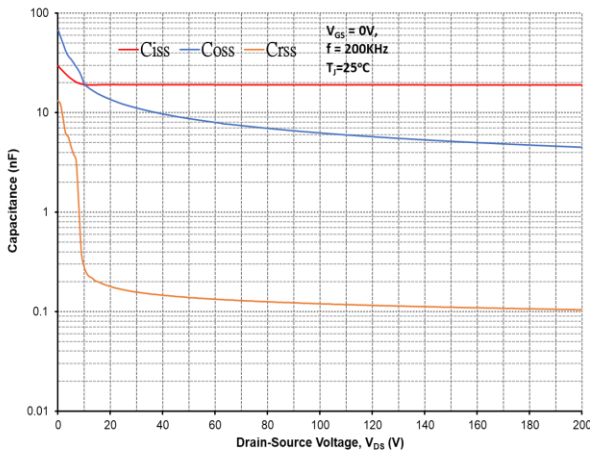


Figure 9. Capacitances vs. Drain-Source Voltage (0-200V)

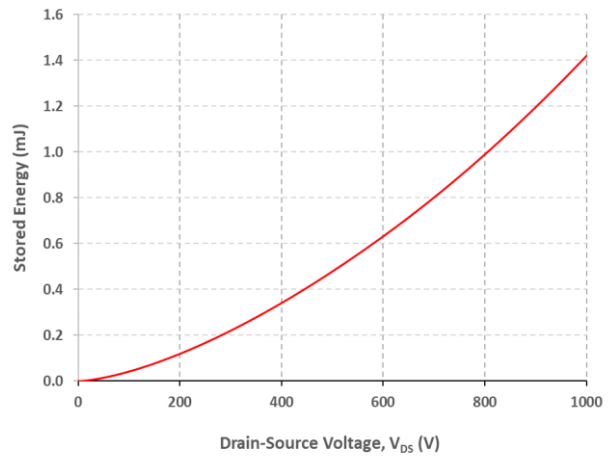


Figure 10. Output Capacitor Stored Energy

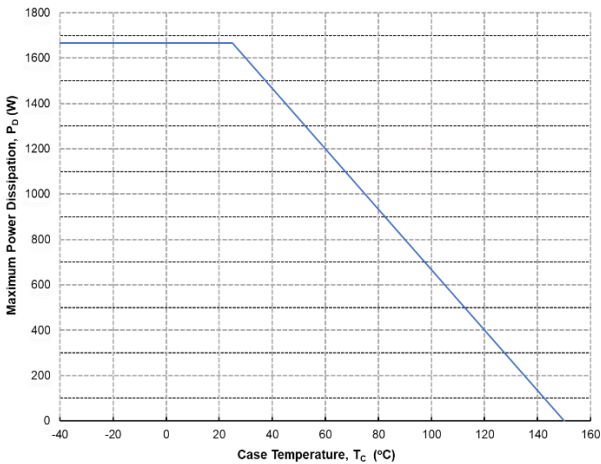


Figure 11. Maximum Power Dissipation (MOSFET) Derating vs. Case Temperature

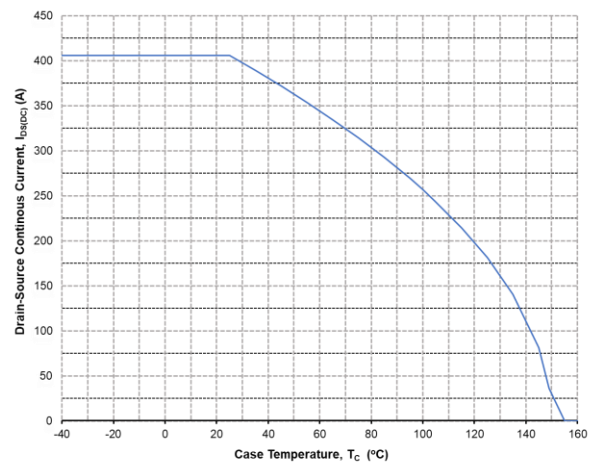


Figure 12. Continuous Drain Current Derating vs. Case Temperature

Typical Performance

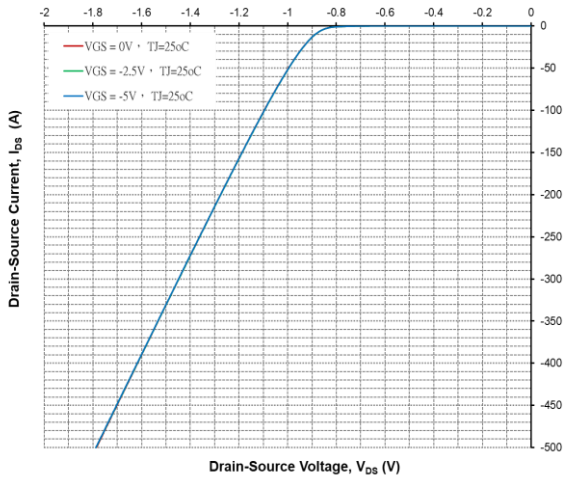


Figure 13. Body Diode Characteristics @ 25°C

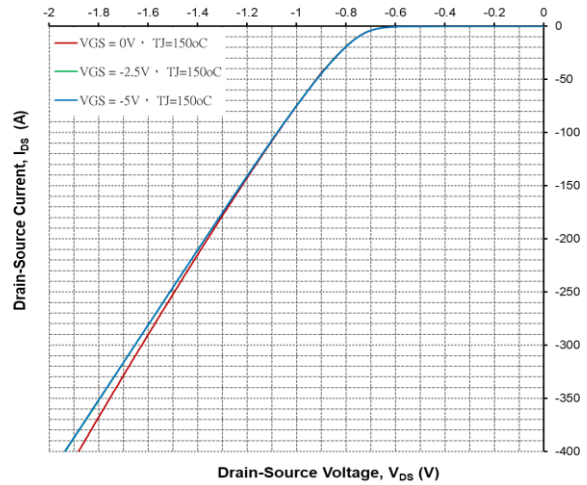


Figure 14. Body Diode Characteristics @ 150°C

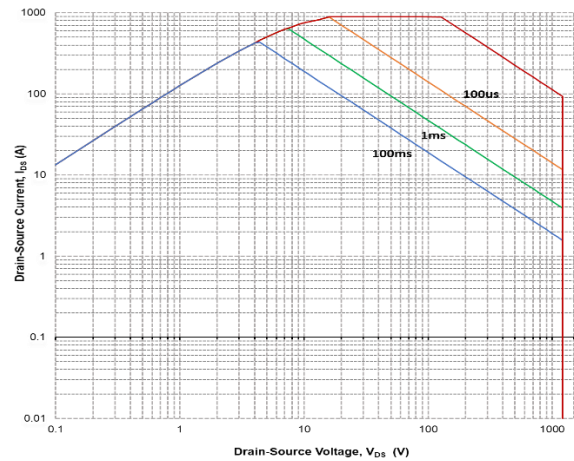
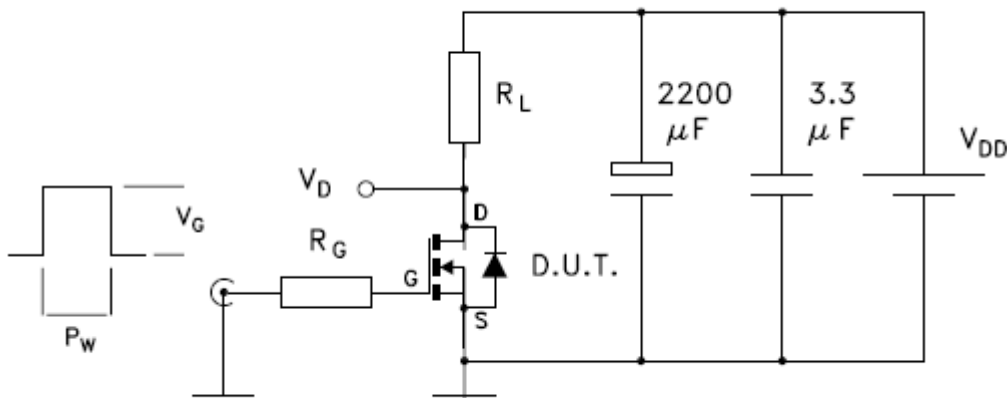
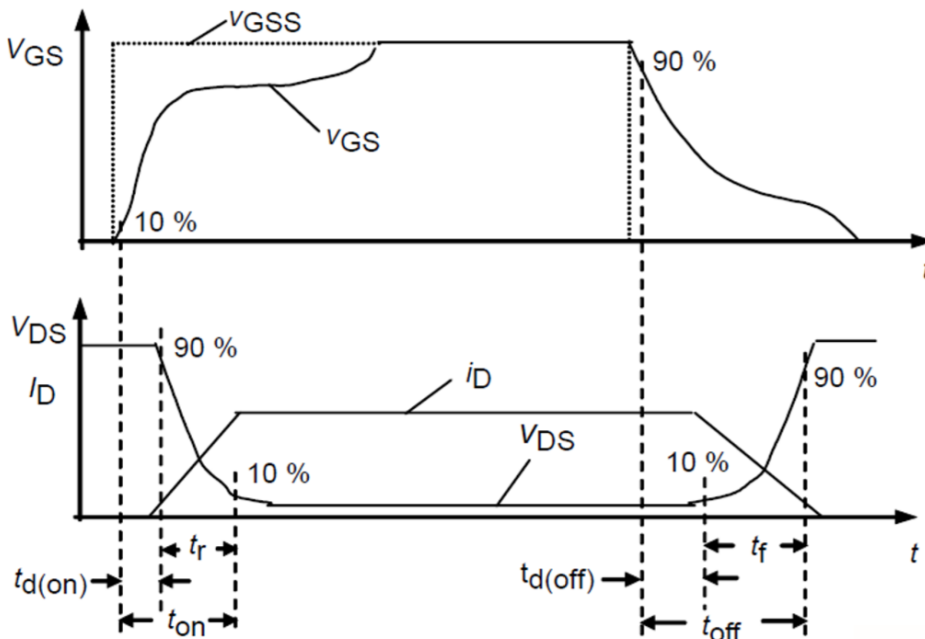


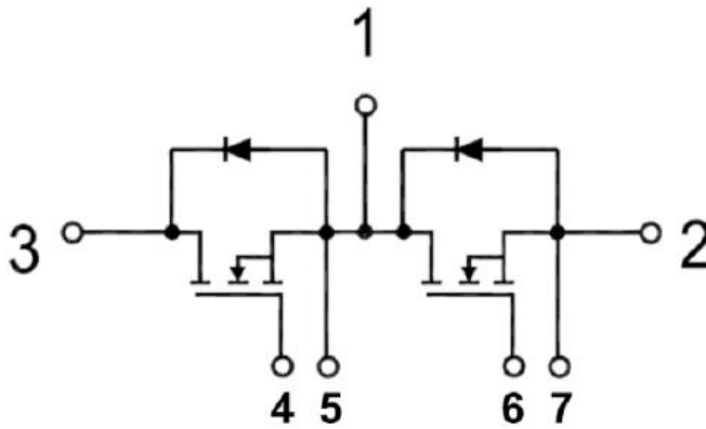
Figure 15. Single Avalanche vs. Temperature

Figure 16. Safe Operating Area

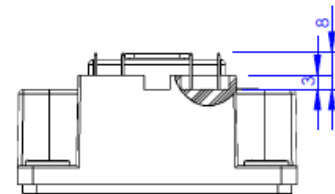
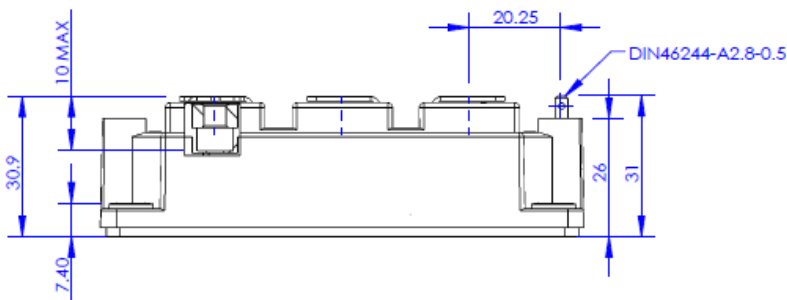
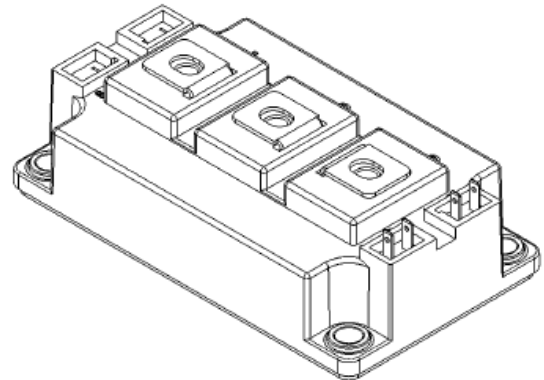
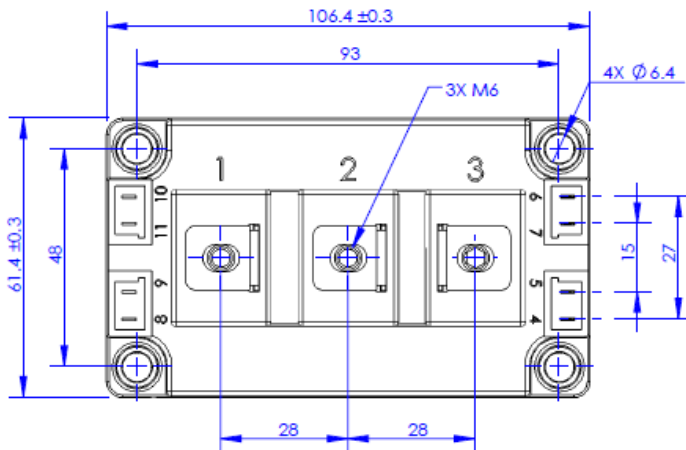
Switching Times Definition



Schematic



Package Dimensions (mm)



Revision History

Revision	Date	Major Changes since last revision
Version 0.1	14/05/2020	First Advance datasheet
Version 0.2	01/06/2020	Update datasheet with R_{th} , I_F and I_{DSS}
Version 0.3	25/09/2020	Update by measurement data