

T1M1K170D

SiC N-MOSFET 1700V, 1000mΩ, 6.7A

Features

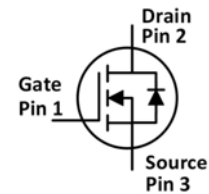
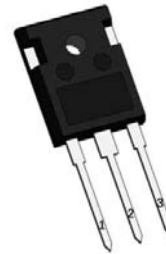
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes

Applications

- Solar Inverters
- Switch Mode Power Supplies
- Auxiliary power supplies
- Smart meters

Product Summary

V_{DS}	1700V
$R_{DS(on)}_{typ}$	1000mΩ
I_D	6.7A



Package Marking and Ordering Information

Part #	Marking	Package
T1M1K170D	1M1K170D	TO-247-3

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1700	V
Continuous drain current $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_D	6.7 5	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	16.7	A
Avalanche energy, single pulse ($L=10\text{mH}$)	E_{AS}	90	mJ
Gate-Source voltage	V_{GS}	-4/+18	V
Gate-Source voltage (Absolute maximum values)	V_{GSmax}	-8/+22	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	86	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	$^\circ\text{C}$

- Example of acceptable V_{GS} waveform



Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	1.7	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristic (at $T_J = 25\text{ °C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	1700	-	-	V	$V_{GS}=0V, I_D=100\mu A$
Gate threshold voltage	$V_{GS(th)}$	1.8	3	4.5	V	$V_{DS}=V_{GS}, I_D=380\mu A$
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	$V_{DS}=1700V, V_{GS}=0V$ $T_C=25\text{ °C}$ $T_C=175\text{ °C}$
Gate-source leakage current	I_{GSS}	-		100	nA	$V_{GS}=20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	700	910	mΩ	$V_{GS}=18V, I_D=1A,$ $T_J=25\text{ °C}$ $T_J=175\text{ °C}$

Dynamic Characteristic

Input Capacitance	C _{iss}	-	285	-	pF	V _{DS} = 1000V V _{GS} = 0V T _J = 25°C V _{AC} = 25mV f = 1MHz
Output Capacitance	C _{oss}	-	15.3	-		
Reverse Transfer Capacitance	C _{rss}	-	2.2	-		
Gate Total Charge	Q _G	-	16.5	-	nC	V _{DS} = 1000V V _{GS} = -5/18V I _D = 1A
Gate-Source charge	Q _{gs}	-	2.7	-		
Gate-Drain charge	Q _{gd}	-	12.5	-		
Turn-On Switching Energy	E _{ON}	-	73.9	-	μJ	V _{DD} = 1000V V _{GS} = -3.5/+18V I _D = 2A R _G = 10Ω L = 1880uH
Turn-Off Switching Energy	E _{OFF}	-	20.4	-		
Turn-on delay time	t _{d(on)}	-	6.2	-	ns	
Rise time	t _r	-	13.7	-		
Turn-off delay time	t _{d(off)}	-	9.4	-		
Fall time	t _f	-	45.4	-		
Gate resistance	R _G	-	18.0	-	Ω	V _{AC} = 25mV, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V _{SD}		4		V	V _{GS} =0V,I _{SD} =1A, T _J =25°C
			3.8			V _{GS} =0V,I _{SD} =1A, T _J =175°C
Body Diode Reverse Recovery Time	t _{rr}	-	33.5	-	ns	V _R = 1000V, V _{GS} = -3.5V/+18V
Body Diode Reverse Recovery Charge	Q _{rr}	-	56.1	-	nC	I _D = 2A,Rg=30Ω di/dt =1000A/μS L=1880μH

Typical Performance Characteristics

Fig 1. Output Characteristic (T_J=-55°C)

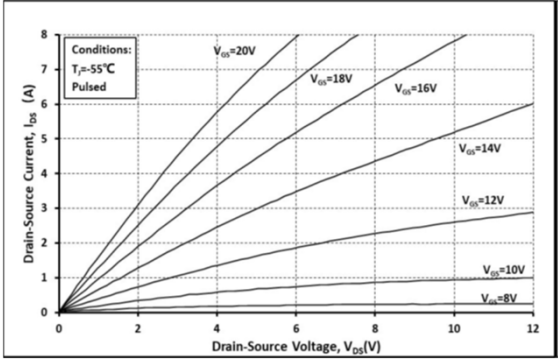


Fig 2. Output Characteristic (T_J=25°C)

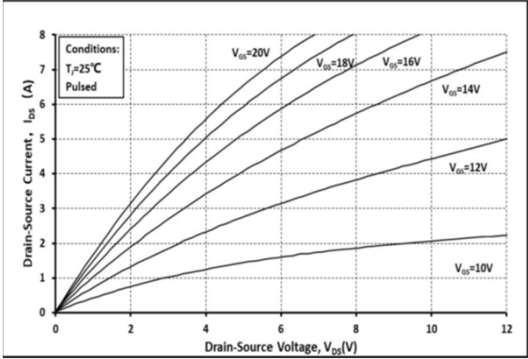


Fig 3. Output Characteristic (T_J=175°C)

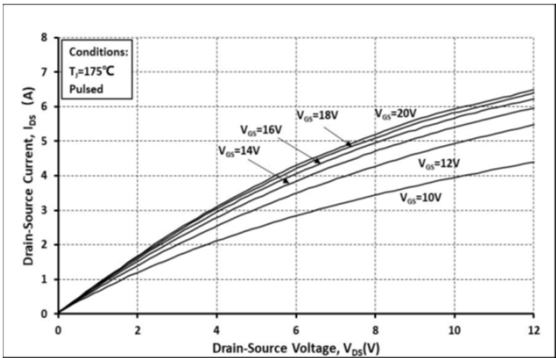


Fig 4: Rdson Vs Ids Characteristic

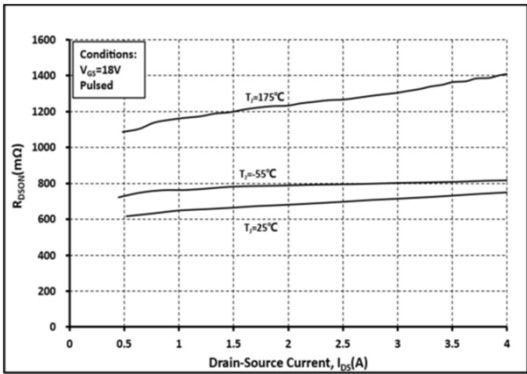


Fig 5: Rds(on) vs. Temperature

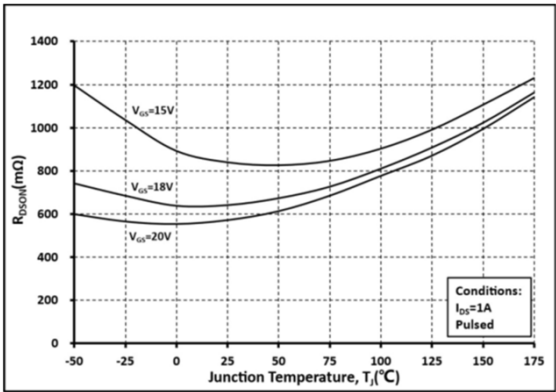


Fig 6: Transfer Characteristic

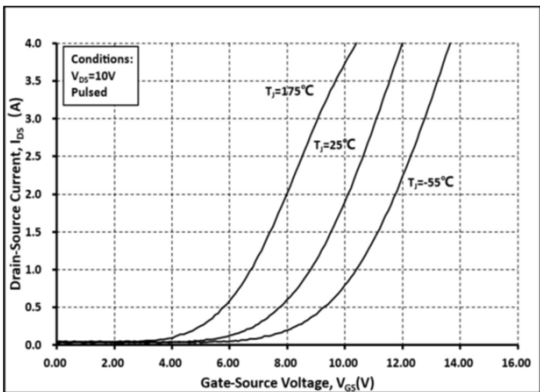


Fig 7: Body-diode Characteristic (T_J=-55°C)

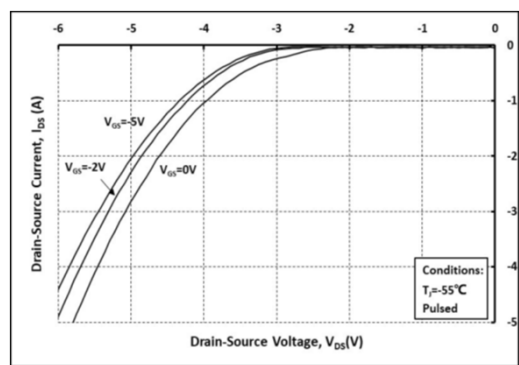


Fig 8: Body-diode Characteristic (T_J=25°C)

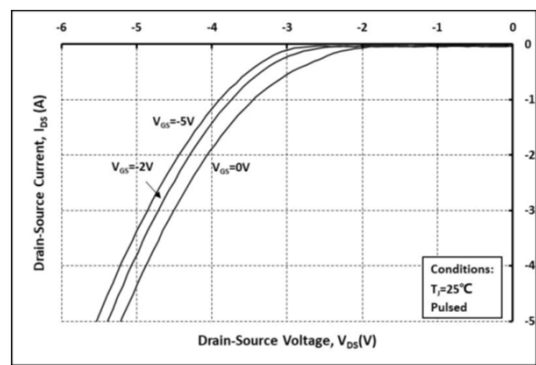


Fig 9: Body-diode Characteristic (T_J=175°C)

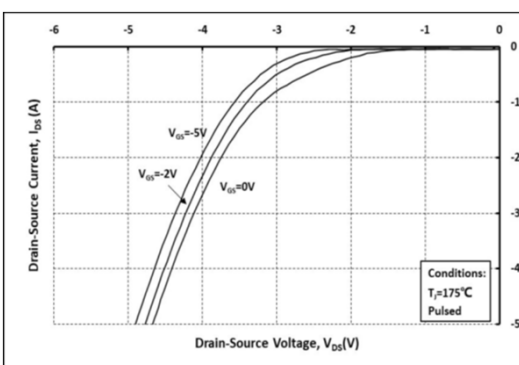


Fig 10: V_{TH} Vs T_J Temperature Characteristic

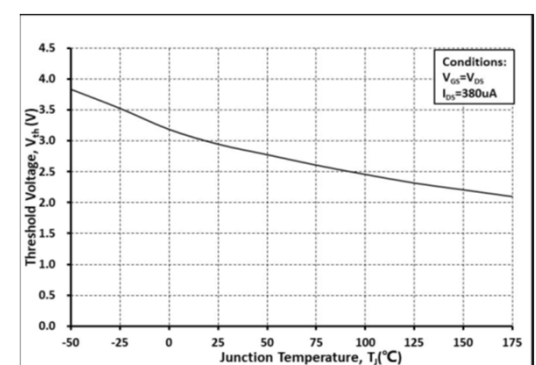


Fig 11: Gate Charge Characteristics

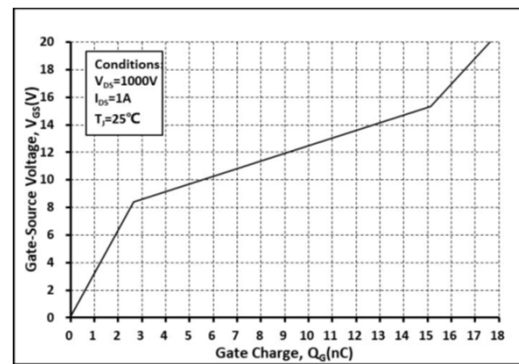


Fig 12: 3rd Quadrant Characteristic(T_J=-55°C)

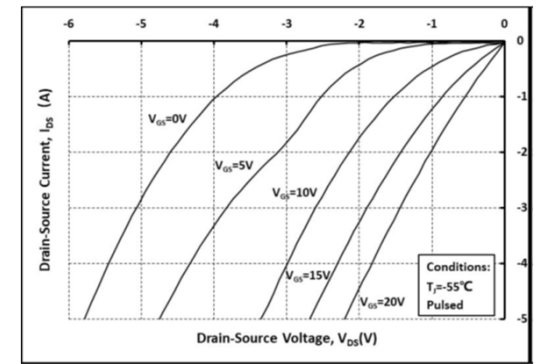


Fig 13: 3rd Quadrant Characteristic($T_J=25^{\circ}\text{C}$)

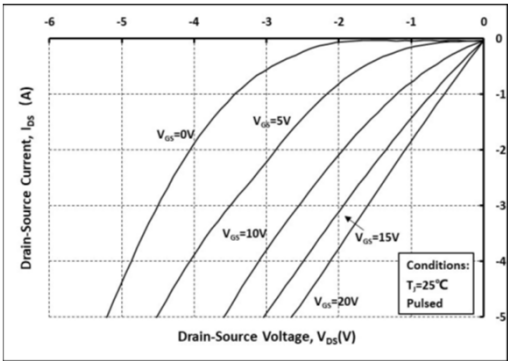


Fig 14: 3rd Quadrant Characteristic($T_J=175^{\circ}\text{C}$)

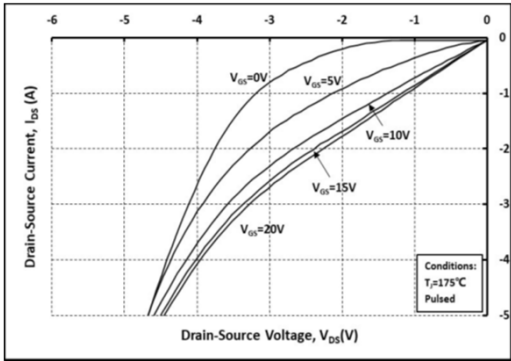


Fig 15: Capacitance Characteristic

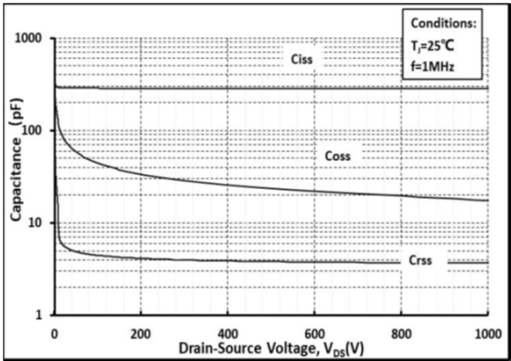


Fig 16: Safe Operating Area

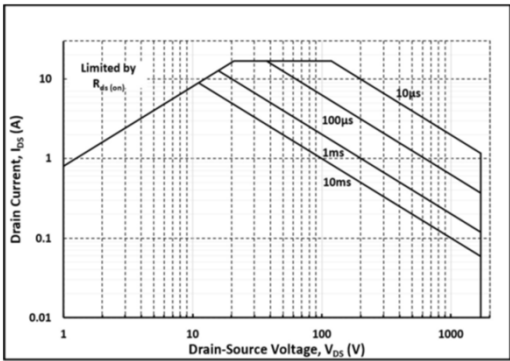
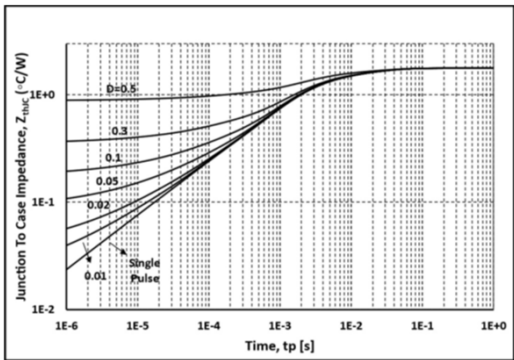


Fig 17: Transient Thermal Impedance



Test Circuit & Waveform

Figure A. Definition of switching times

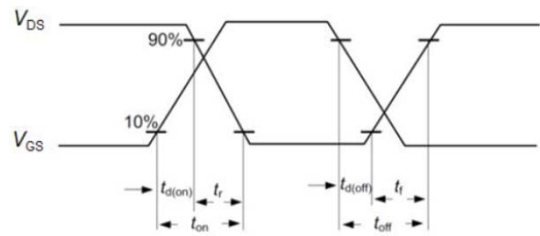


Figure B. Dynamic test circuit

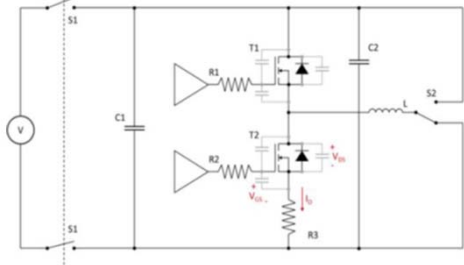


Figure C. Definition of body diodeswitching characteristics

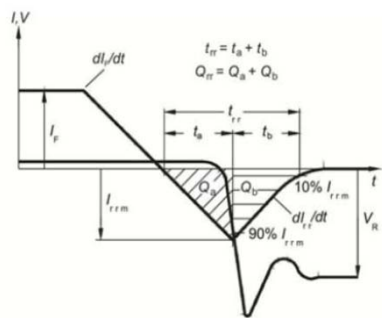
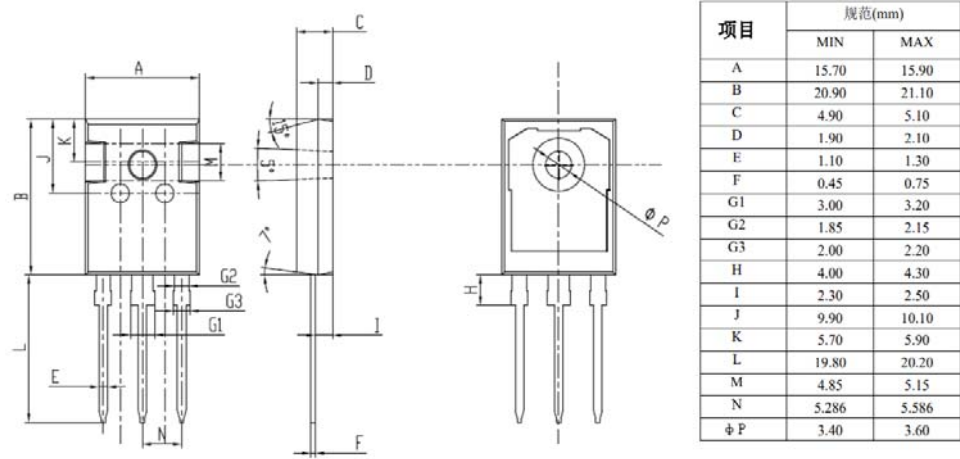


Figure C. Definition of diode switching characteristics

Package Outline:



Contact Information

TANI website: <http://www.tanisemi.com> Email: tani@tanisemi.com

For additional information, please contact your local Sales Representative.



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