

Features

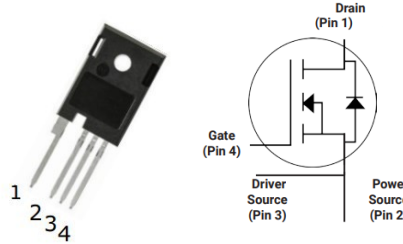
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes

Product Summary

V_{DS}	1200V
$R_{DS(on)_{typ}}$	40mΩ
I_D	65A

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Battery Chargers



Package Marking and Ordering Information

Part #	Marking	Package
T2M40120K	2M40120K	TO-247-4

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current $T_C = 25^\circ\text{C}$, $V_{GS} = 18\text{V}$ $T_C = 100^\circ\text{C}$, $V_{GS} = 18\text{V}$	I_D	65 46	A
Source current(Body Diode) $T_C = 25^\circ\text{C}$, $V_{GS} = -4\text{V}$ $T_C = 100^\circ\text{C}$, $V_{GS} = -4\text{V}$	I_S	65 46	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	I_{DM}	218	A
Avalanche energy, single pulse ($L=10\text{mH}$)	E_{AS}	1200	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}	333	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}	0.45	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

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

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

Static Characteristic

Drain-source breakdown voltage	$V_{(BR)DSS}$	1200	-	-	V	$V_{GS}=0V, I_D=100\mu A$
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	$V_{DS}=V_{GS}, I_D=10mA$
Zero gate voltage drain current	I_{DSS}	-	1	5	μA	$V_{DS}=1200V, V_{GS}=0V$ $T_C=25^{\circ}\text{C}$
		-	5	-		$T_C=175^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-		100	nA	$V_{GS}=18V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	35	45	mΩ	$V_{GS}=18V, I_D=33A,$ $T_J=25^{\circ}\text{C}$
		-	60	-		$T_J=175^{\circ}\text{C}$
Drain-source on-state resistance	$R_{DS(on)}$	-	40	52	mΩ	$V_{GS}=15V, I_D=33A,$ $T_J=25^{\circ}\text{C}$
		-	70	-		$T_J=175^{\circ}\text{C}$

Dynamic Characteristic

Input Capacitance	C _{iss}	-	2735	-	pF	V _{DS} = 1000V V _{GS} = 0V T _J = 25°C V _{AC} =25mV f = 1MHz
Output Capacitance	C _{oss}	-	101	-		
Reverse Transfer Capacitance	C _{rss}	-	7.5	-		
Gate Total Charge	Q _G	-	73.3	-	nC	V _{DS} = 800V V _{GS} = 0/+15V I _D = 33A I _G =10mA
Gate-Source charge	Q _{gs}	-	13.5	-		
Gate-Drain charge	Q _{gd}	-	19	-		
Turn-On Switching Energy	E _{ON}	-	0.29	-	mJ	V _{DD} = 800V V _{GS} = -4/+15V I _D = 20A R _G = 3.8Ω L = 120uH T _J = 25°C
Turn-Off Switching Energy	E _{OFF}	-	0.08	-		
Turn-on delay time	t _{d(on)}	-	26.8	-	ns	
Rise time	t _r	-	25	-		
Turn-off delay time	t _{d(off)}	-	29.6	-		
Fall time	t _f	-	12.8	-		
Gate resistance	R _G	-	2.4	-	Ω	V _{AC} = 25mV, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		4.2		V	$V_{GS} = -4V, I_{SD} = 20A, T_J = 25^\circ C$
			3.8			$V_{GS} = -4V, I_{SD} = 20A, T_J = 175^\circ C$
Reverse Recovery Time	t_{rr}	-	18.8	-	ns	$V_R = 800V$ $I_D = 33A$ $di/dt = 1011A/\mu S$ $V_{GS} = -4/15V$ $T_J = 25^\circ C$
Reverse Recovery Charge	Q_{rr}	-	120.4	-	nC	
Reverse Recovery Energy	E_{REC}	-	0.9	-	uJ	
Peak Reverse Recovery Current	I_{rrm}	-	11	-	A	
Charge Time	t_A	-	10	-	ns	
DisCharge Time	t_B	-	8.8	-	ns	
Reverse Recovery Time	t_{rr}	-	53	-	ns	$V_R = 800V$ $I_D = 33A$ $di/dt = 1011A/\mu S$ $V_{GS} = -4/15V$ $T_J = 175^\circ C$
Reverse Recovery Charge	Q_{rr}	-	662	-	nC	
Reverse Recovery Energy	E_{REC}	-	161	-	uJ	
Peak Reverse Recovery Current	I_{rrm}	-	19	-	A	
Charge Time	t_A	-	16.4	-	ns	
DisCharge Time	t_B	-	33.8	-	ns	

Typical Performance Characteristics

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

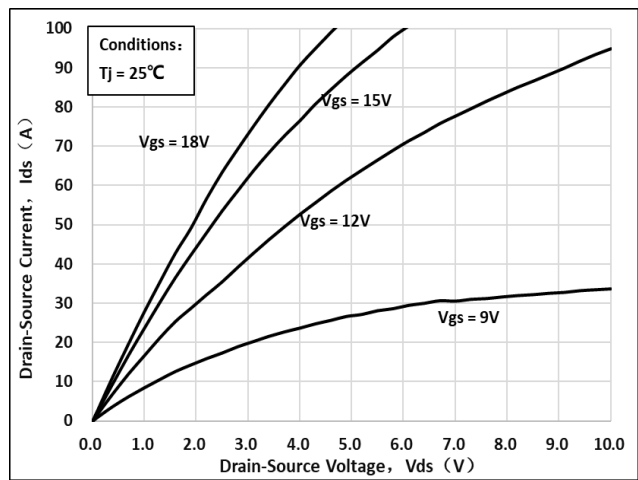


Fig 2. Output Characteristic (T_J=25°C)

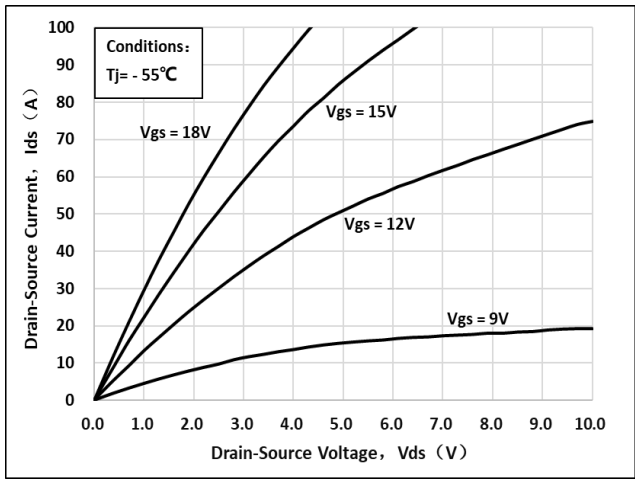


Fig 3. Output Characteristic (T_J=175°C)

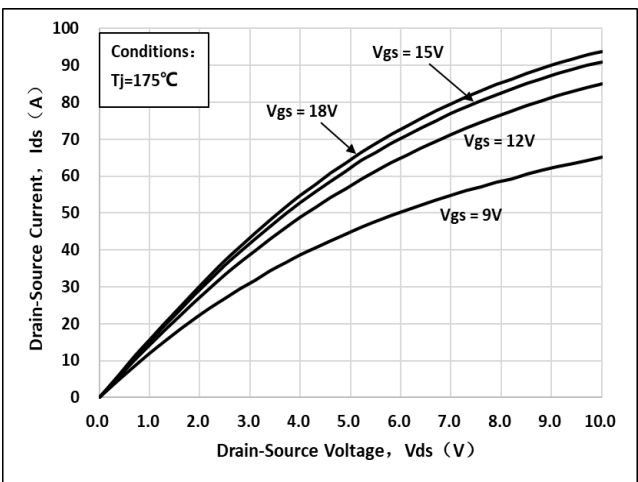


Fig 4: Rdson Vs Ids Characteristic

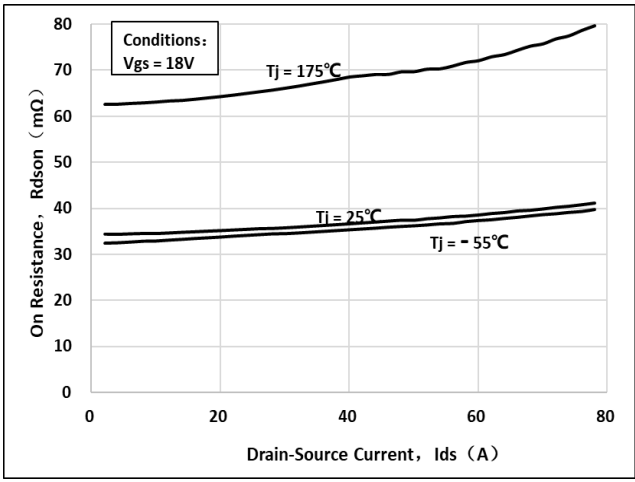


Fig 5: Rds(on) vs. Temperature

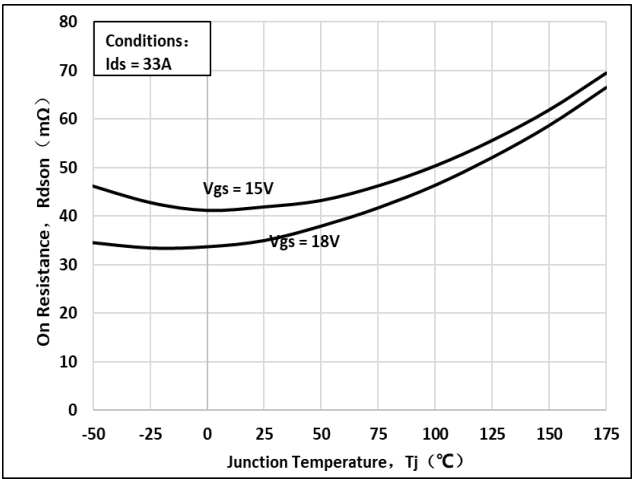


Fig 6: Transfer Characteristic

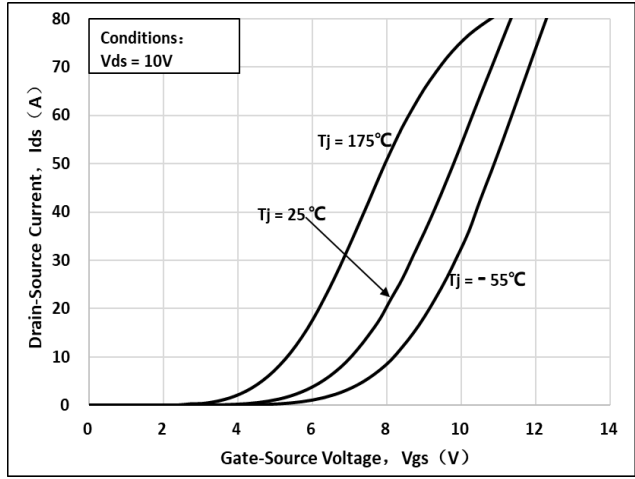


Fig 7: Body-diode Characteristic (T_J=-55°C)

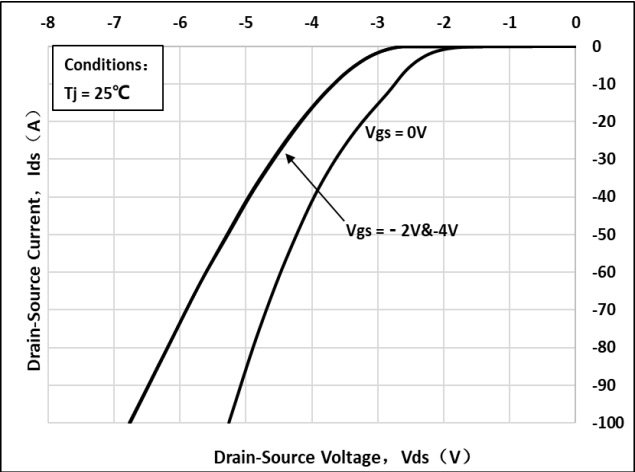


Fig 8: Body-diode Characteristic (T_J=25°C)

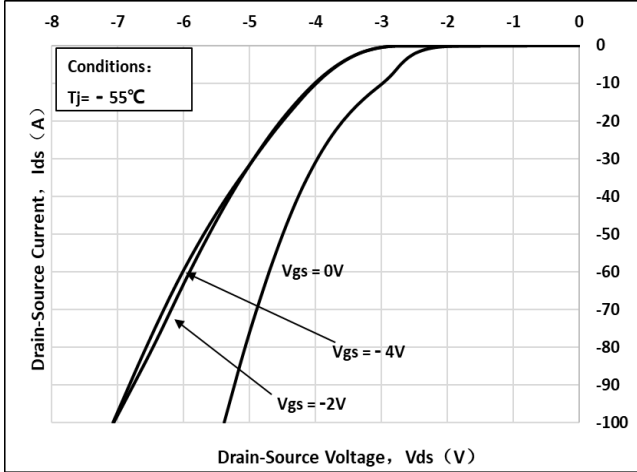


Fig 9: Body-diode Characteristic (T_J=175°C)

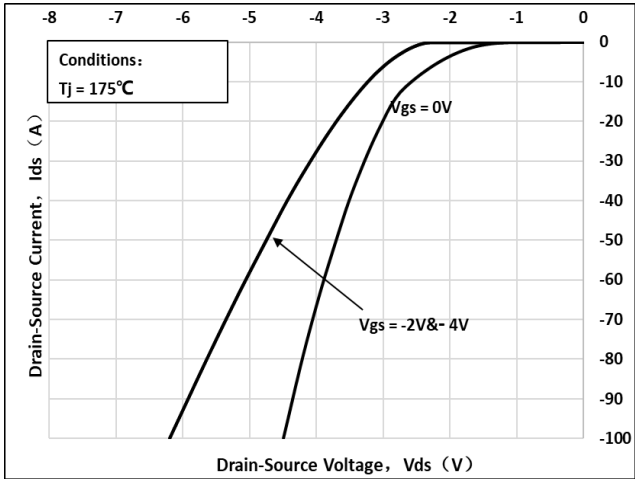


Fig 10: V_{TH} Vs T_J Temperature Characteristic

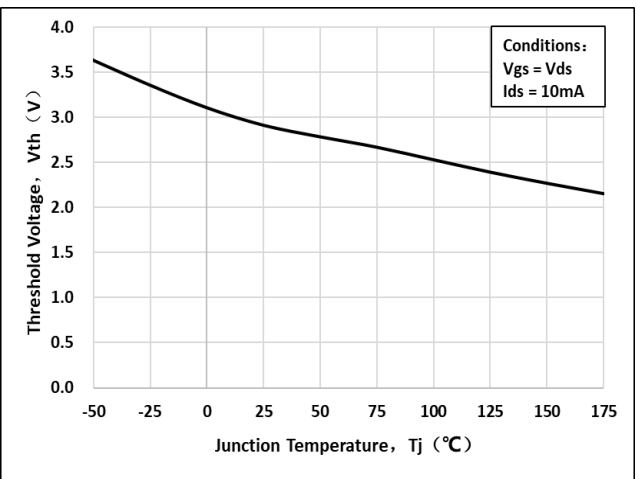


Fig 11: 3rd Quadrant Characteristic(T_J=-55°C)

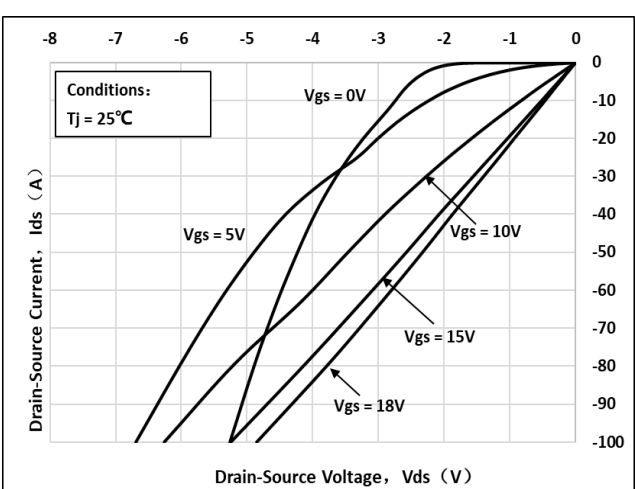


Fig 12: 3rd Quadrant Characteristic(T_J=25°C)

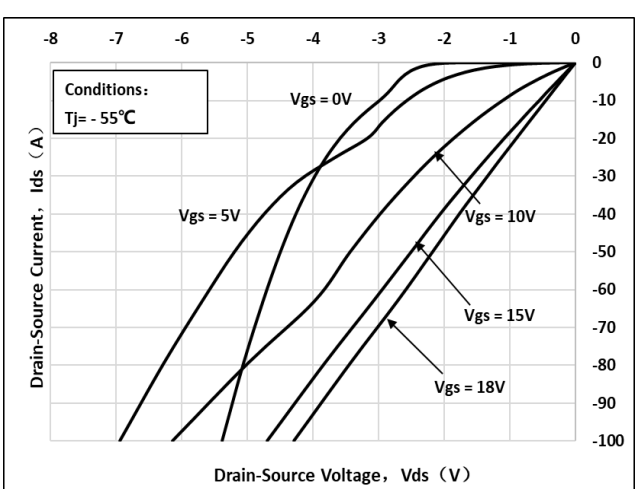


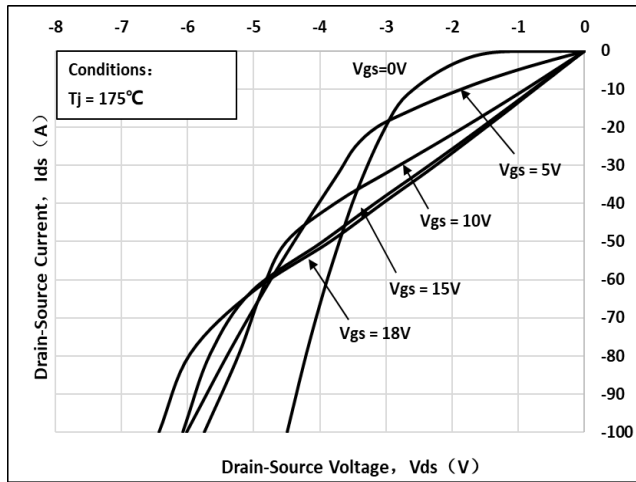
Fig 13: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

Fig 14: Gate Charge Characteristics

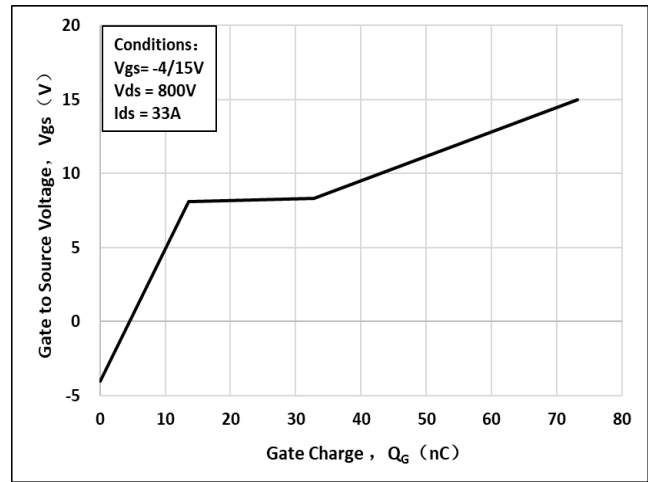


Fig 15: Drain Current vs. Case Temperature

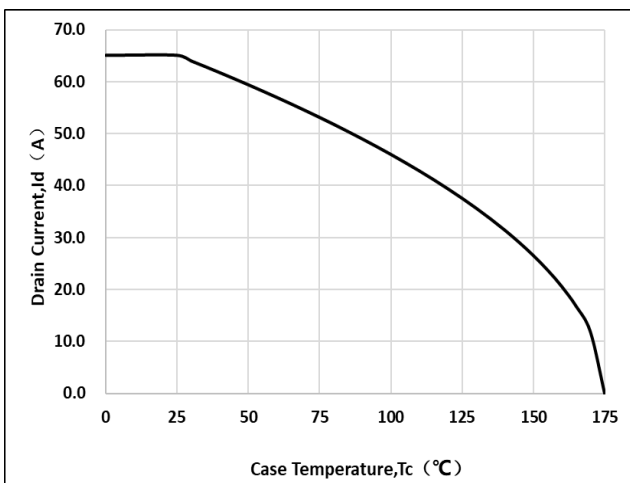


Fig 16: Safe Operating Area

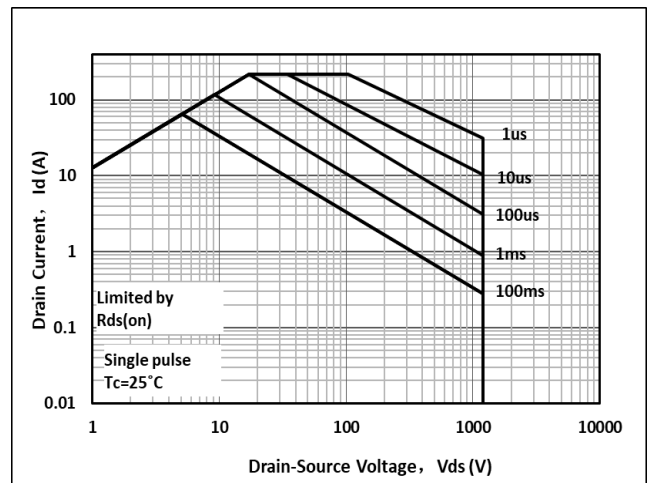


Fig 17: Capacitance Characteristics

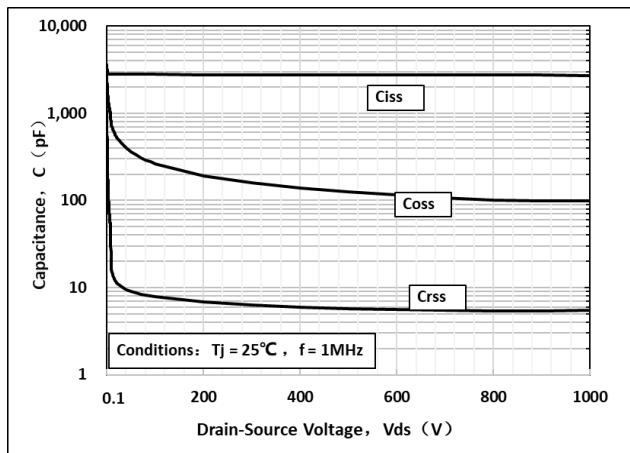
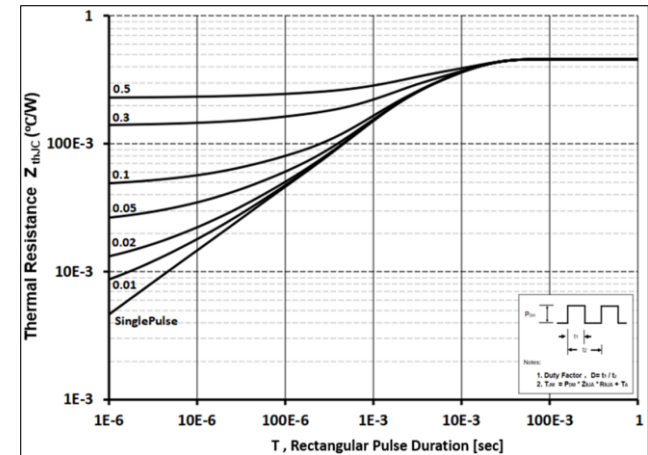


Fig 18: Transient Thermal Impedance



Test Circuit & Waveform

Figure A. Definition of switching times

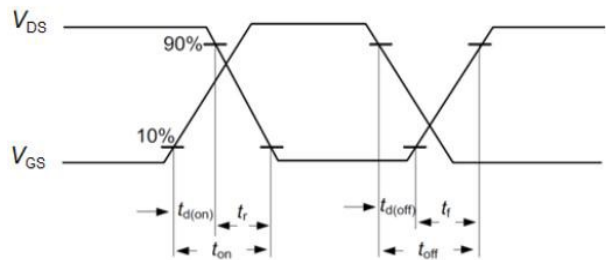


Figure B. Dynamic test circuit

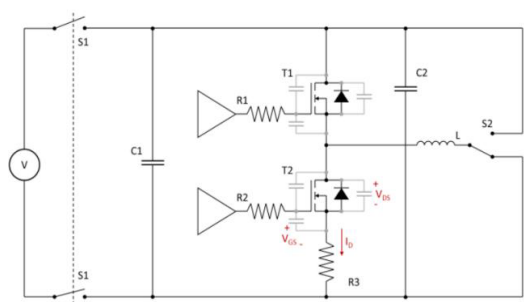


Figure C. Definition of body diodeswitching characteristics

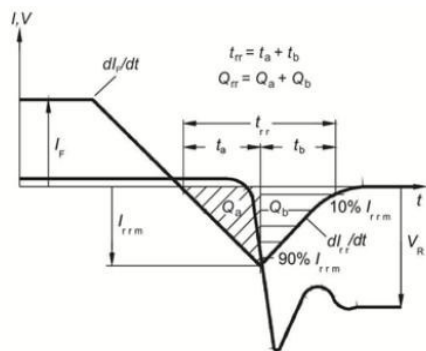
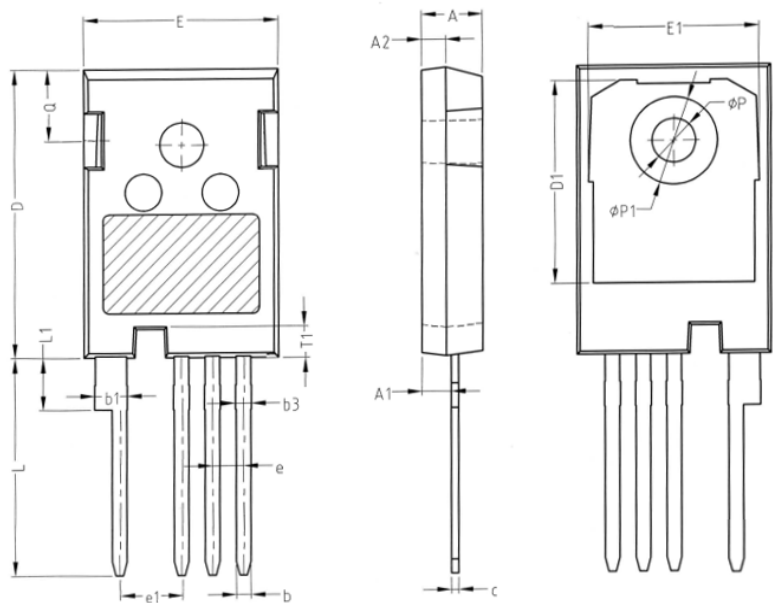


Figure C. Definition of diode switching characteristics

Package Outline:



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b3	1.07	1.30	1.60
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	16.85
E	15.74	15.94	16.14
E1	13.72	14.02	14.32
T1	2.35	2.50	2.65
e	2.54 BSC		
e1	5.08 BSC		
Q	5.49	5.79	6.09
L	17.27	17.57	17.87
L1	3.99	4.19	4.39
Φp	3.40	3.60	3.80
Φp1	7.19 REF		

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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Product Specification Statement

The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. TANI shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and TANI assumes no responsibility for the application of the product. TANI strives to provide accurate and up-to-date information to the best of our ability. However, due to technical, human, or other reasons, TANI cannot guarantee that the information provided in the product specification is entirely accurate and error-free. TANI shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications.

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The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. TANI shall assume no responsibility for any consequences resulting from such usage.

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