

Features

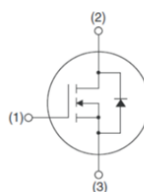
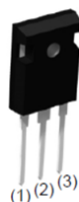
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes

Applications

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

Product Summary

V_{DS}	650V
$R_{DS(on)_{typ}}$	45mΩ
I_D	49A



Package Marking and Ordering Information

Part #	Marking	Package
T1M45065D	1M45065D	TO-247-3

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current $V_{GS}=18V$ $T_C = 25^{\circ}C$ $V_{GS}=18V$ $T_C = 100^{\circ}C$	I_D	49 35	A
Pulsed drain current ($T_C = 25^{\circ}C$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	123	A
Avalanche energy, single pulse ($L=10mH$)	E_{AS}	1000	mJ
Gate-Source voltage	V_{GSOP}	-4/+18	V
Gate-Source voltage (dynamic,Absolute maximum values)	V_{GSmax}	-8/+22	V
Power dissipation ($T_C = 25^{\circ}C$)	P_{tot}	241	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	$^{\circ}C$

- Example of acceptable V_{GS} waveform



Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.62	°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}	650	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	2	-	4	V	$V_{DS}=V_{GS}, I_D=4.8mA$
Zero gate voltage drain current	I_{DSS}	-	1	100	μA	$V_{DS}=650V, V_{GS}=0V$ $T_j=25\text{ °C}$
		-	10	-		$T_j=175\text{ °C}$
Gate-source leakage current	I_{GSS}	-		250	nA	$V_{GS}=18V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	45	59	mΩ	$V_{GS}=18V, I_D=17.6A,$ $T_j=25\text{ °C}$
		-	55	-		$T_j=175\text{ °C}$
Transconductance	g_{fs}	-	6.4	-	S	$V_{DS}=20V, I_D=17.6A$

Dynamic Characteristic

Input Capacitance	C _{iss}	-	1509	-	pF	V _{DS} = 650V V _{GS} = 0V T _J = 25°C V _{AC} = 25mV f = 1MHz
Output Capacitance	C _{oss}	-	130	-		
Reverse Transfer Capacitance	C _{rss}	-	16	-		
Gate Total Charge	Q _G	-	69.9	-	nC	V _{DS} = 400V V _{GS} = 0/18V I _D = 17.6A
Gate-Source charge	Q _{gs}	-	15.4	-		
Gate-Drain charge	Q _{gd}	-	28	-		
Turn-On Switching Energy	E _{ON}	-	87.4	-	μJ	V _{DD} = 400V V _{GS} = -4/+18V I _D = 17.6A R _G = 5Ω L = 100uH
Turn-Off Switching Energy	E _{OFF}	-	24	-		
Turn-on delay time	t _{d(on)}	-	10.56	-	ns	
Rise time	t _r	-	4.16	-		
Turn-off delay time	t _{d(off)}	-	19.52	-		
Fall time	t _f	-	6.4	-		
Gate resistance	R _G	-	0.9	-	Ω	V _{AC} = 25mV, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V _{SD}		3.2		V	V _{GS} =0V, I _{SD} =8.8A, T _J =25°C
			2.7			V _{GS} =0V, I _{SD} =8.8A, T _J =175°C
Continuous Diode Forward Current	I _S		48		A	V _{GS} =-4V, T _C =25°C
Body Diode Reverse Recovery Time	t _{rr}	-	20.4	-	ns	V _R = 400V, I _D = 17.6A di/dt = 1000A/μS
Body Diode Reverse Recovery Charge	Q _{rr}	-	114.1	-	nC	

Typical Performance Characteristics

Fig 1. Output Characteristic ($T_J = -55^{\circ}\text{C}$)

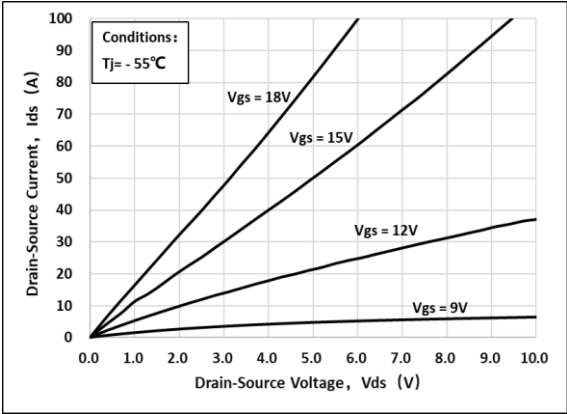


Fig 2. Output Characteristic ($T_J = 25^{\circ}\text{C}$)

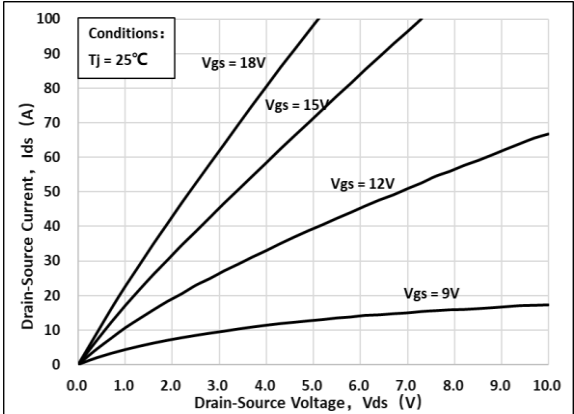


Fig 3. Output Characteristic ($T_J = 175^{\circ}\text{C}$)

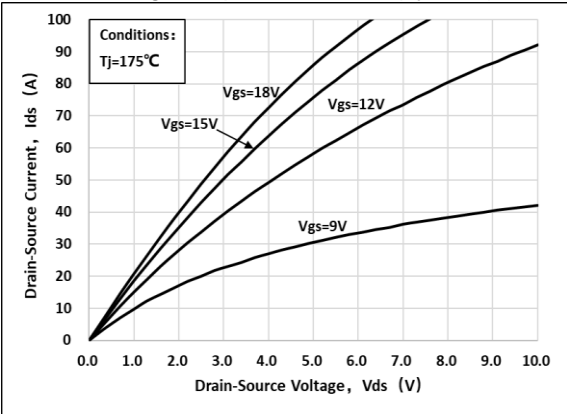


Fig 4: $R_{ds(on)}$ Vs I_{ds} Characteristic

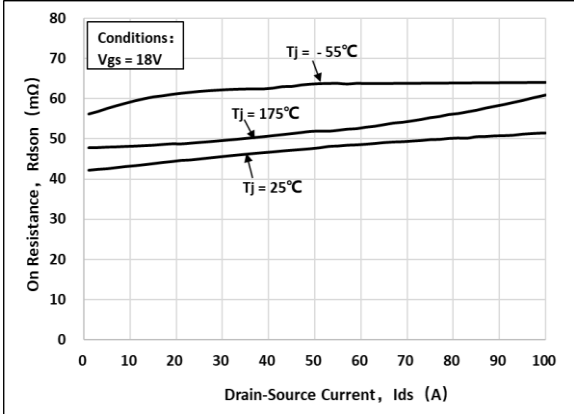


Fig 5: $R_{ds(on)}$ vs. Temperature

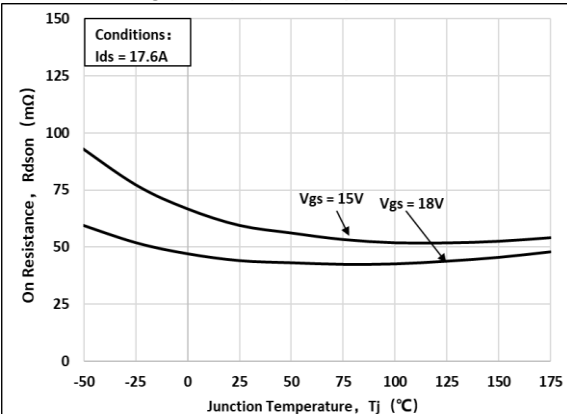


Fig 6: Transfer Characteristic

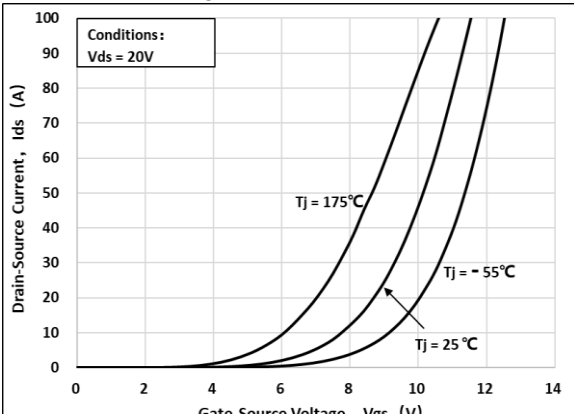


Fig 7: Body-diode Characteristic (T_J=-55°C)

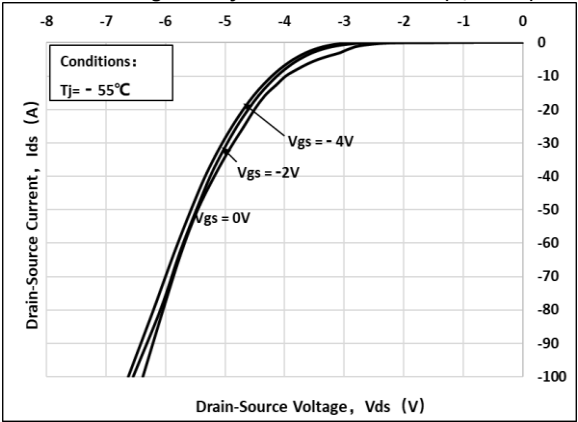


Fig 8: Body-diode Characteristic (T_J=25°C)

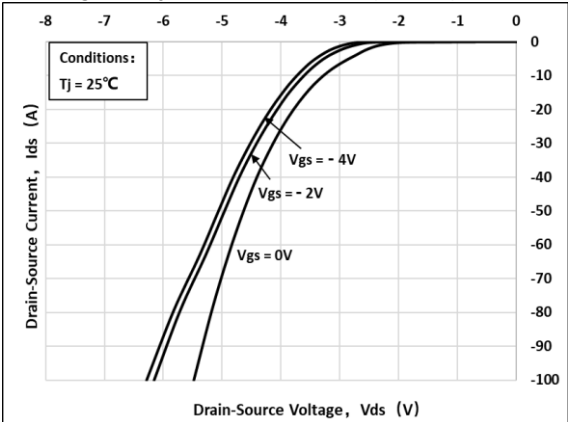


Fig 9: Body-diode Characteristic (T_J=175°C)

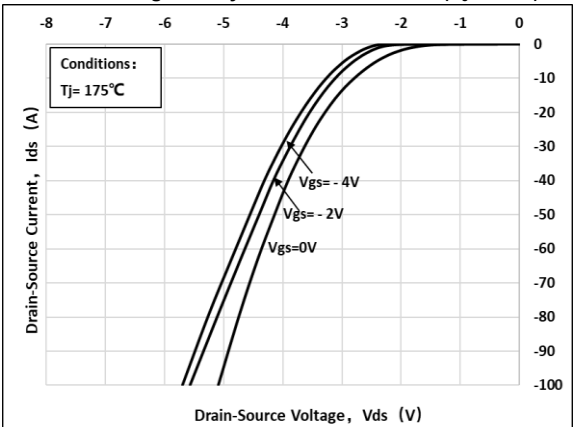


Fig 10: V_{th} Vs T_J Temperature Characteristic

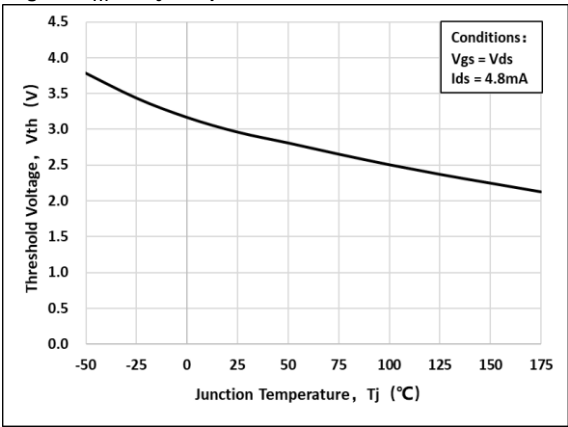


Fig 11: Gate Charge Characteristics

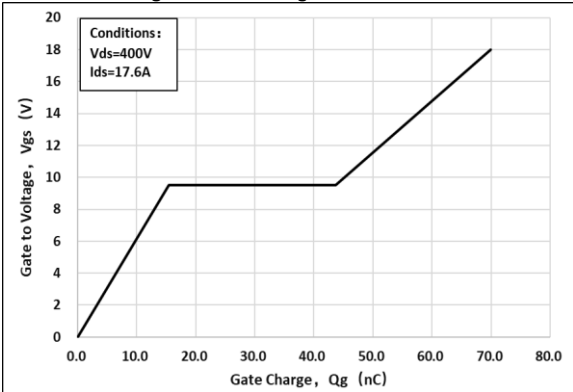


Fig 12: 3rd Quadrant Characteristic (T_J=-55°C)

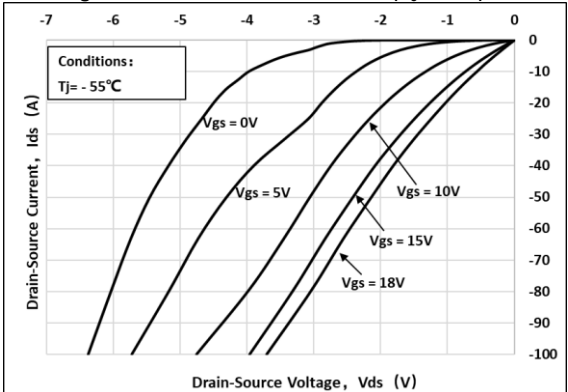


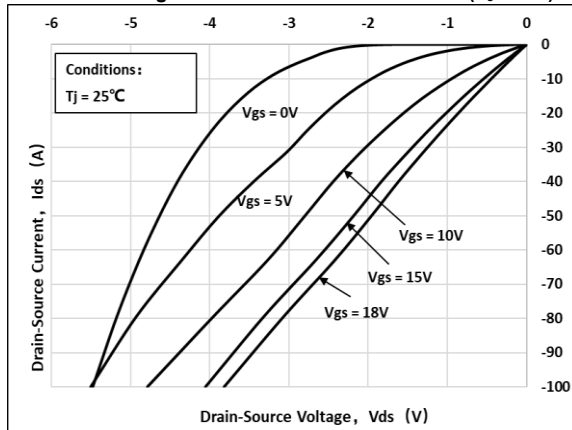
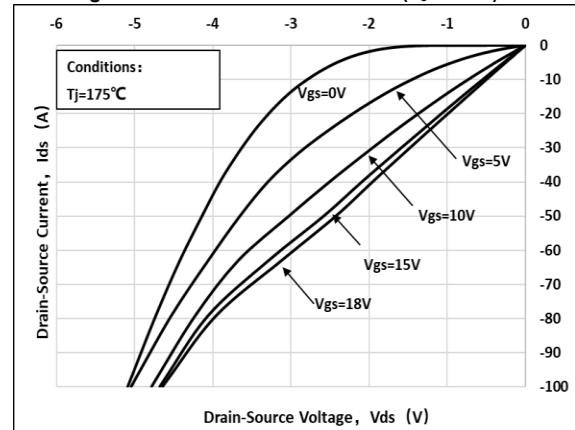
Fig 13: 3rd Quadrant Characteristic($T_J=25^\circ\text{C}$)Fig 14: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

Fig 15: Capacitance Characteristic

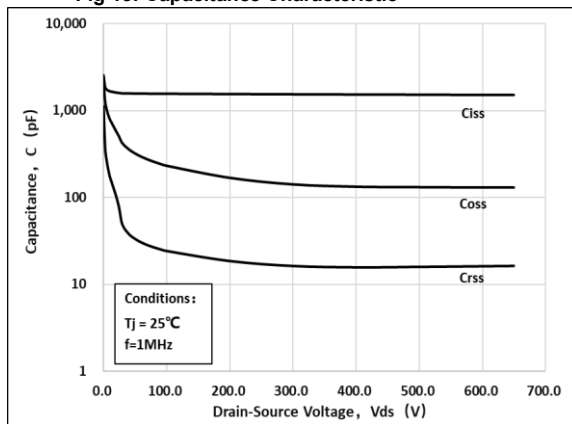


Fig 16: Safe Operating Area

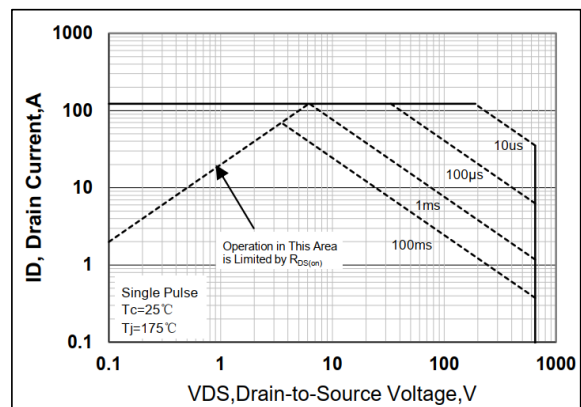
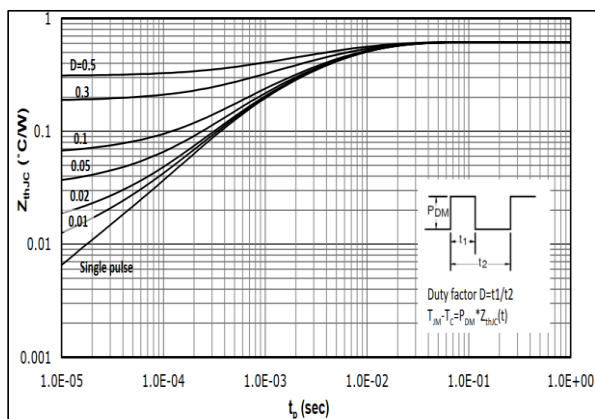


Fig 17: Transient Thermal Impedance



Test Circuit & Waveform

Figure A. Definition of switching times

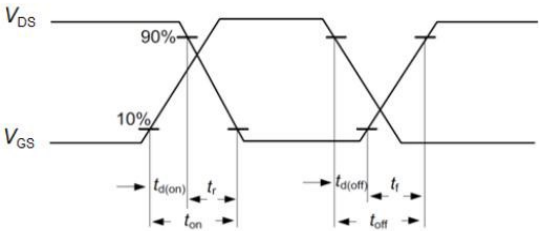


Figure B. Dynamic test circuit

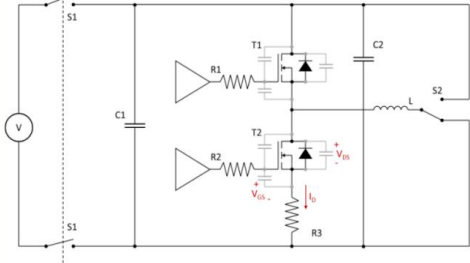
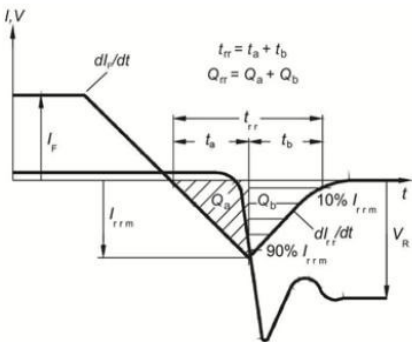
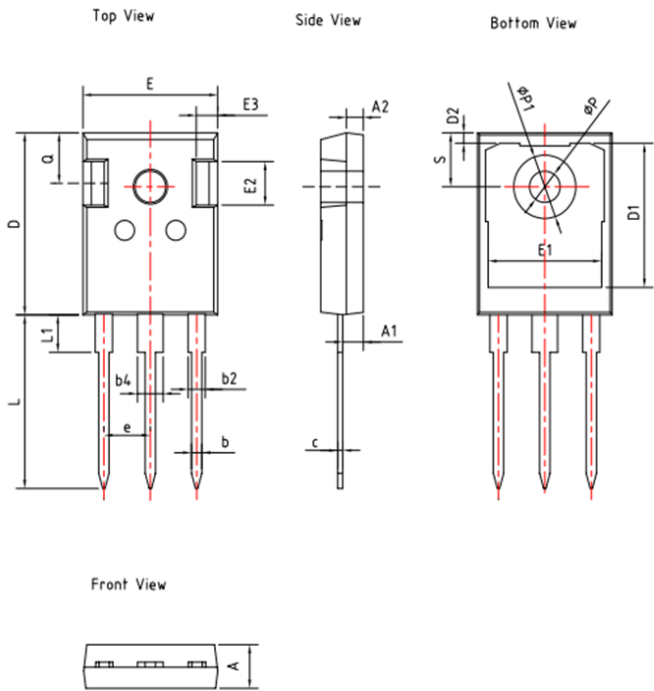


Figure C. Definition of body diodeswitching characteristics



Package Outline:



Dimension unit:(mm)			
SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.60	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
D2	1.00	1.20	1.35
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44 BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
φP	3.40	3.60	3.80
φP1	-	-	7.30
Q	5.40	5.80	6.20
S	6.20 BSC		

Contact Information

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For additional information, please contact your local Sales Representative.



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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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