SuperMOS – SOT-523 20V BV_{DSS}, 125mΩ $R_{DS(ON)}$, N-channel MOSFET

1. Description

The DMG1012T-ES is N-Channel enhancement MOS Field Effect Transistor. Uses advanced technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product DMG1012T-ES is Pb-free.

2. Features

- 20V, $R_{DS(ON)}$=125mΩ(Typ.) @ V_{GS}=4.5V
  $R_{DS(ON)}$=190mΩ(Typ.) @V_{GS}=2.5V
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

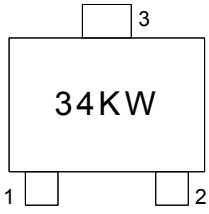
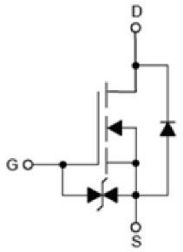
3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
DMG1012T-ES	SOT-523	34KW	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

Copyright© ElecSuper Incorporated

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 ˚C ambient temperature unless otherwise specified.

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		BV_{DSS}	20	V
Gate-Source Voltage		V_{GS}	±10	V
Continuous Drain Current	T_A=25°C	I_D	0.9	A
	T_A=100°C		0.6	
Maximum Power Dissipation		P_D	0.23	W
Pulsed Drain Current		I_{DM}	3.6	A
Operating Junction Temperature		T_J	150	°C
Lead Temperature		T_L	260	°C
Storage Temperature Range		T_{stg}	-55 to 150	°C

Thermal resistance ratings

Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance	t ≤ 10s	$R_{\theta JA}$		543	°C/W

Electrical Characteristics

At TA = 25℃ unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V, V_{GS}=0V			1	uA
Gate-to-source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±10V			±10	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250uA	0.4	0.65	1.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	V_{GS}=4.5V, I_D=0.5A		125	165	mΩ
		V_{GS}=2.5V, I_D=0.3A		190	300	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS}=0V, f=1MHz, V_{DS}=10V		60		pF
Output Capacitance	C_{OSS}			22		
Reverse Transfer Capacitance	C_{RSS}			12		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS}=4.5V, V_{DS}=10V, I_D=0.9A		1		nC
Gate-to-Source Charge	Q_{GS}			0.28		
Gate-to-Drain Charge	Q_{GD}			0.22		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	V_{GS}=4.5V, V_{DS}=10V, I_D=0.5A, R_G=10Ω		2		ns
Rise Time	t_r			20		
Turn-Off Delay Time	$t_{d(OFF)}$			10		
Fall Time	t_f			23		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	V_{GS}=0V, I_S=0.9A			1.5	V

7. Typical Characteristic

Figure1: Output Characteristics

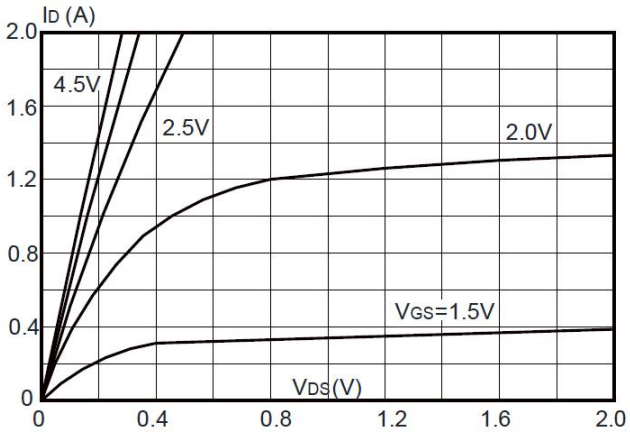


Figure 2: Typical Transfer Characteristics

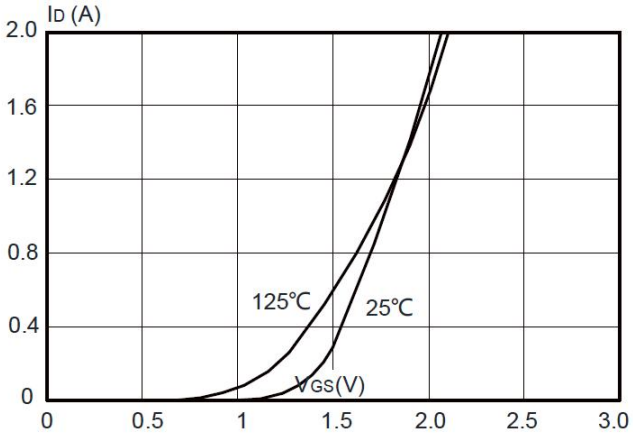


Figure 3: On-resistance vs. Drain Current

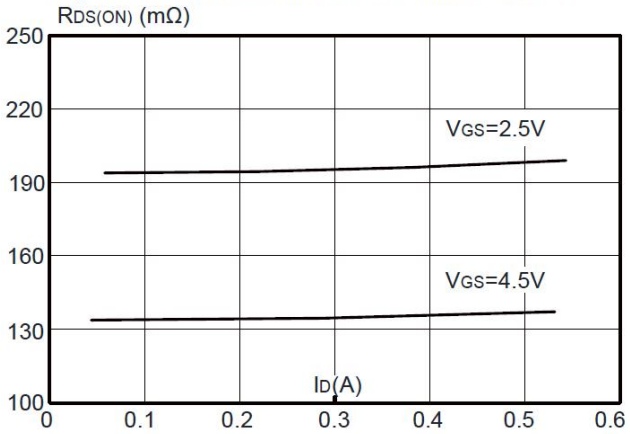


Figure 4: Body Diode Characteristics

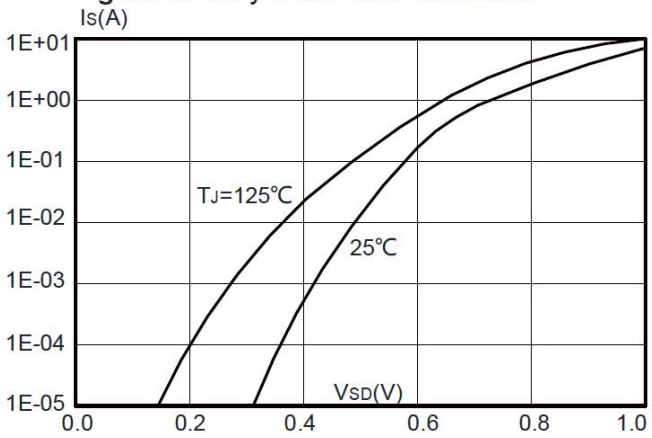


Figure 5: Gate Charge Characteristics

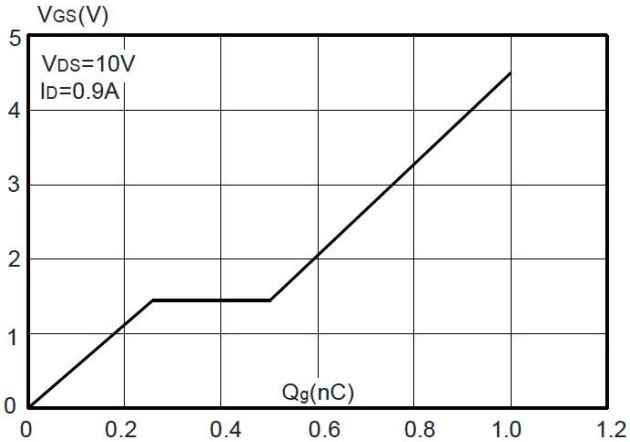


Figure 6: Capacitance Characteristics

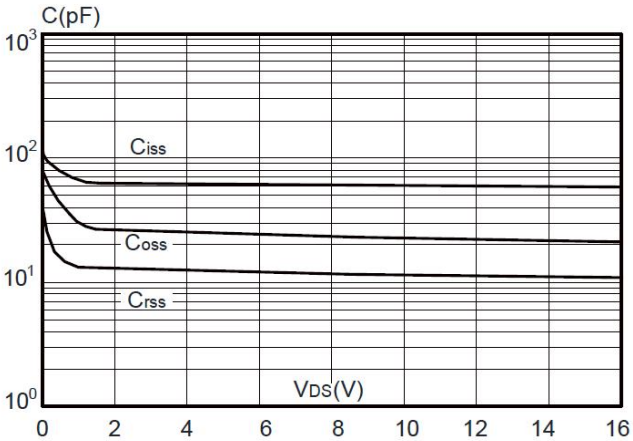


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

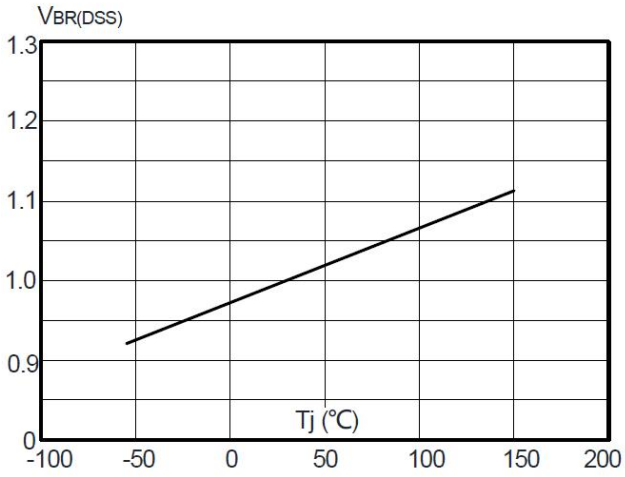


Figure 8: Normalized on Resistance vs. Junction Temperature

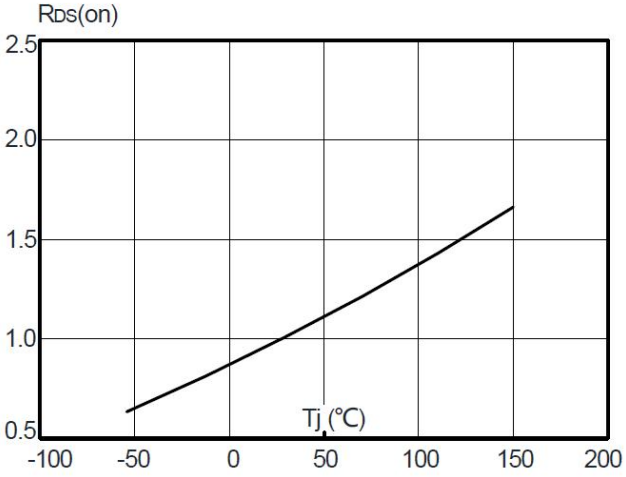


Figure 9: Maximum Safe Operating Area

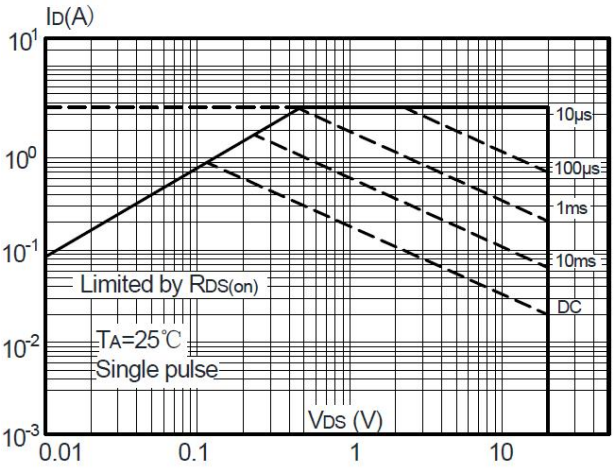


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

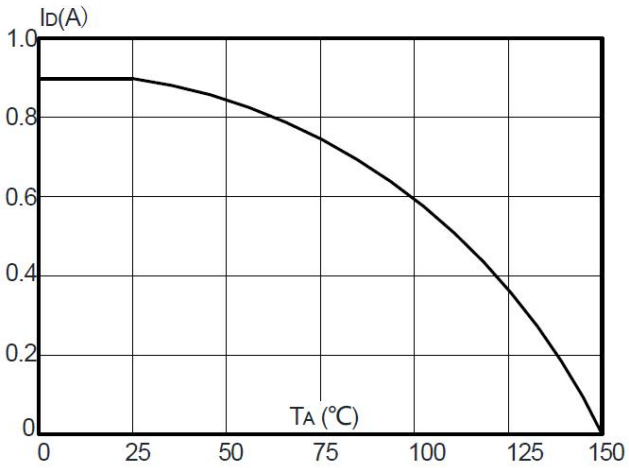
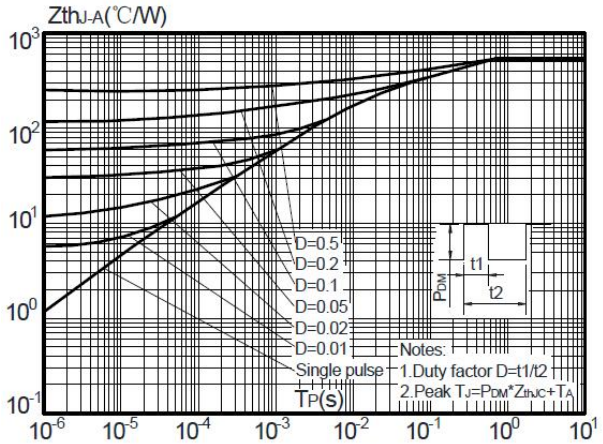
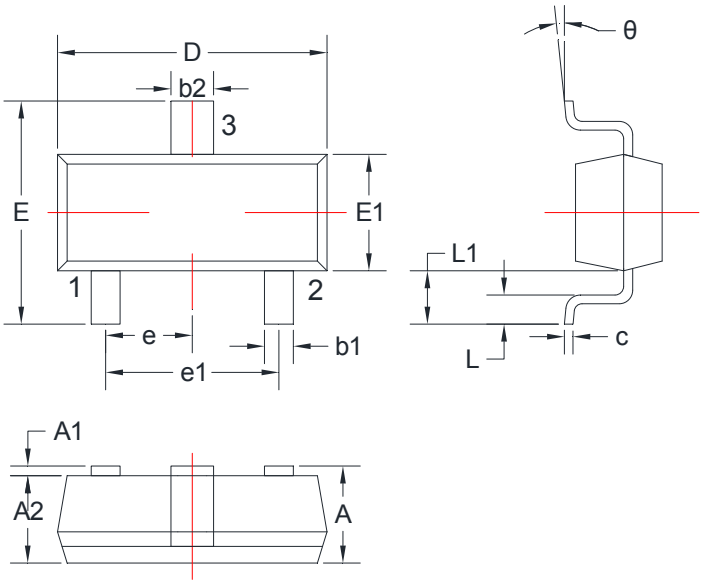


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



8. Dimension (SOT-523)



REF	Millimeters		REF	Millimeters	
	Min	Max		Min	Max
A	0.70	0.90	E	1.45	1.75
A1	0.00	0.10	E1	0.70	0.90
A2	0.70	0.80	e	0.50 TYP	
b1	0.15	0.25	e1	0.90	1.10
b2	0.25	0.35	L	0.26	0.46
c	0.10	0.20	L1	0.40 REF	
D	1.50	1.70	θ	0°	8°

Copyright© ElecSuper Incorporated

DISCLAIMER

ELECSUPER PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with ElecSuper products. You are solely responsible for
(1) selecting the appropriate ElecSuper products for your application;
(2) designing, validating and testing your application;
(3) ensuring your application meets applicable standards, and any other safety, security, or other requirements.
These resources are subject to change without notice. ElecSuper grants you permission to use these resources only for development of an application that uses the ElecSuper products described in the resource. Other reproduction and display of these resources are prohibited. No license is granted to any other ElecSuper intellectual property right or to any third party intellectual property right. ElecSuper disclaims responsibility for, and you will fully indemnify ElecSuper and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources. ElecSuper’s products are provided subject to ElecSuper’s Terms of Sale or other applicable terms available either on www.elecsuper.com or provided in conjunction with such ElecSuper products. ElecSuper’s provision of these resources does not expand or otherwise alter ElecSuper’s applicable warranties or warranty disclaimers for ElecSuper products.

Copyright© ElecSuper Incorporated