500V DUAL N-Channel MOSFET

Description

DAWIN'S Dual power MOSFET devices are designed for switching applications of high voltage and current. (You have to connect external fast recovery diode reverse connected across each MOSFET)
The mounting base of the module is electrically isolated from semiconductor elements for simple heat-sink construction.

Features

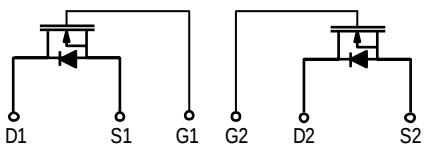
- $R_{DS(ON)}$ = 0.06Ω Max. @ V_{GS}=10V, I_D=100A
- Gate Charge = 250nC(typ.)
- Improved dv/dt Capability, High Ruggedness
- Maximum Junction Temperature Range = 150℃
- 100% avalanche tested
- Isolation Type Package

Applications

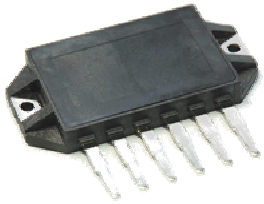
High efficient SMPS, Active PFC

Equivalent Circuit and Package

Equivalent Circuit



Package : 6DM-2 Series



Please see the package Out line information

Absolute Maximum Ratings @ T_j=25℃(Per Leg)

Symbol	Parameter	Conditions	Ratings	Unit
V_{DSS}	Drain-Source Voltage	-	500	V
V_{GS}	Gate-Source Voltage	-	±20	V
I_D	Continuous Drain Current	Tc = 25℃	100	A
		Tc = 100℃	60	A
$I_{DM\ (1)}$	Pulsed Drain Current (Note 1)	-	400	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	-	4000	mJ
E_{AR}	Repetitive Avalanche Energy (Note 1)	-	120	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	-	4.5	V/ns
P_D	Maximum Power Dissipation	Tc = 25℃	1000	W
Tj	Operating Junction Temperature	-	-40 ~ 150	℃
Tstg	Storage Temperature Range	-	-40 ~ 125	℃
Viso	Isolation Voltage	AC 1 minute	2500	V
	Mounting screw Torque :M3	-	4.0	N.m
TL	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 9 seconds	-	260	℃

Electrical Characteristics of MOSFET @ T_C=25℃ (unless otherwise specified)

Symbol	Parameter	Conditions	Values			Units
			Min.	Typ.	Max.	
Off Characteristics						
BV_{DSS}	Drain - Source Breakdown Voltage	V_{GS} = 0V , I_D = 250uA	500	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	V_{GS} = 0V , I_D = 250㎂	-	0.6	-	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS} = 500V , V_{GS} = 0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage Current	V_{GE} = ±30V	-	-	±200	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = 250uA	3.0	-	5.0	V
$R_{DS(ON)}$	Static Drain-Source On-State Resistance	V_{GS}= 10V, I_D= 50A		0.045	0.06	Ω
g_{fs}	Forward Transconductance	V_{DS}= 50V, I_D= 100A	-	17.5	-	S
Dynamic Characteristics						
Ciss	Input capacitance	V_{GS} = 0V, V_{DS}= 25V, f= 1MHz	-	12000	-	pF
Coss	Output capacitance		-	1800	-	
Crss	Reverse transfer capacitance		-	200	-	
td(on)	Turn on delay time	V_{DD} = 250V , I_D = 100A	-	175	-	ns
tr	Turn on rise time	R_G = 18 Ω	-	700	-	
td(off)	Turn off delay time	(Note 4,5)	-	500	-	
tf	Turn off fall time		-	300	-	
Qg	Total Gate Charge	V_{DS} = 400V	-	250	-	nC
Qgs	Gate-Source Charge	V_{GS} = 10V (Note 4, 5)	-	68	-	
Qgd	Gate-Drain Charge (Miller Charge)	I_D = 100A	-	145	-	

Electrical Characteristics of FRD @ T_C=25℃ (unless otherwise specified)

Symbol	Parameter	Conditions	Values			Unit
			Min.	Typ.	Max.	
I_S	Continuous Source Current	Integral Reverse p-n Junction Diode in the MOSFET	-	-	100	A
I_{SM}	Pulsed Source Current		-	-	400	
V_{SD}	Diode Forward Voltage	I_S= 100A, V_{GS}= 0V	-	-	1.4	V
t_{rr}	Reverse Recovery Time	I_S= 100A, V_{GS}= 0V, di_F/dt= 100A/us	-	770	-	ns
Q_{rr}	Reverse Recovery Charge		-	11	-	uC

Thermal Characteristics and Weight

Symbol	Parameter	Conditions	Values			Unit
			Min.	Typ.	Max.	
$R_{\Theta JC}$	Thermal Resistance, Junction-to-Case		-	-	0.12	℃/W
$R_{\Theta CS}$	Thermal Resistance, Case-to-Sink		0.1	-	-	℃/W
Weight	Weight of Module		-	-	30	g

※ NOTES

1. Repetitive rating : pulse width limited by junction temperature
2. L= 1.75mH, I_{AS}= 100A, V_{DD}= 50.0V, R_G= 18Ω, starting T_J= 25℃
3. I_{SD} ≤ 100A, di/dt ≤ 200A/us, V_{DD}≤BV_{DSS}, starting T_J= 25℃
4. Pulse Test : Pulse width ≤ 300/us, Duty Cycle ≤ 2%
5. Essentially independent of operating temperature

Performance Curves

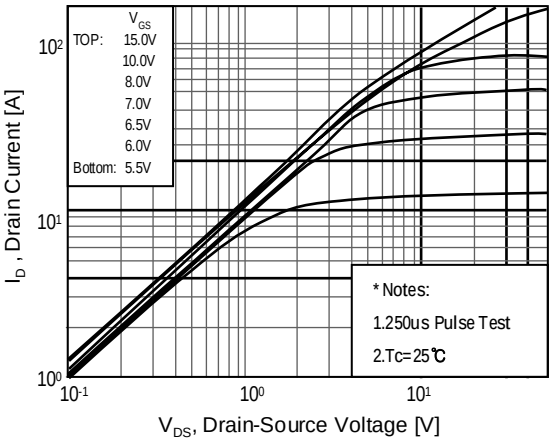


Fig 1. On – Region Characteristics

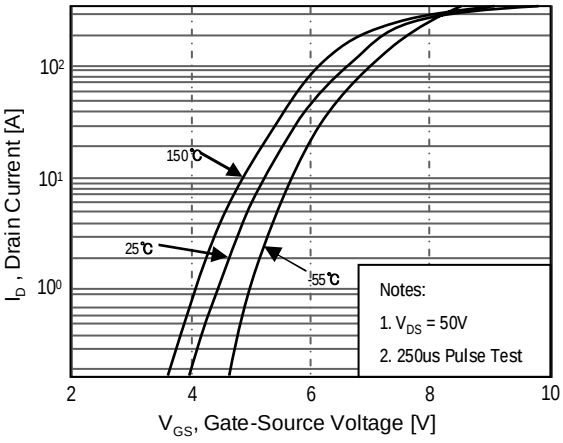


Fig 2. Transfer Characteristics

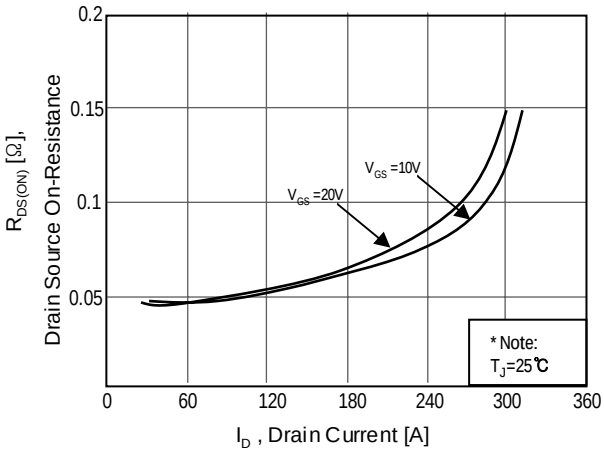


Fig 3. On – Resistance Variation vs. Drain Current and Gate Voltage

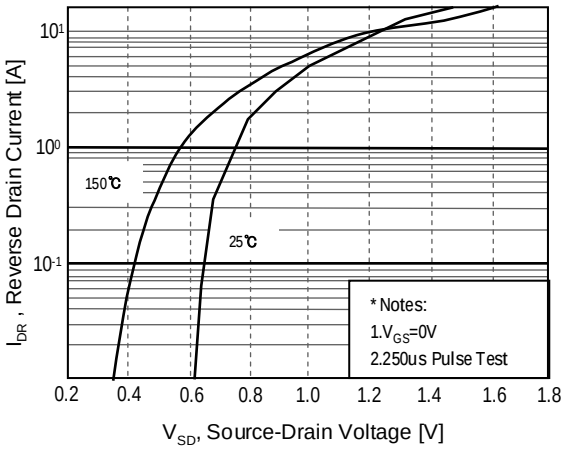


Fig 4. Body Diode Forward Voltage Variation vs. Source Current and Temp.

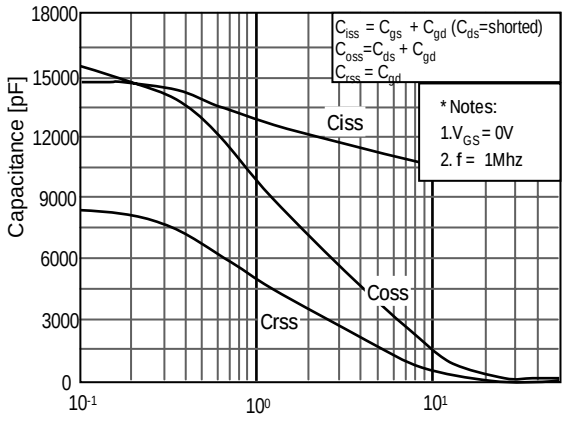


Fig 5. Capacitance Characteristics

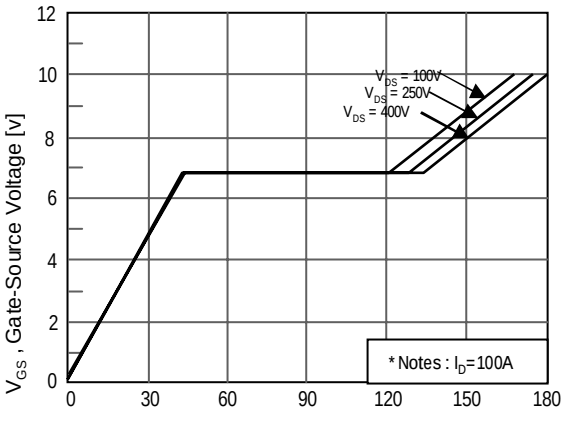


Fig 6. Gate Charge Characteristics

Performance Curves (Continued)

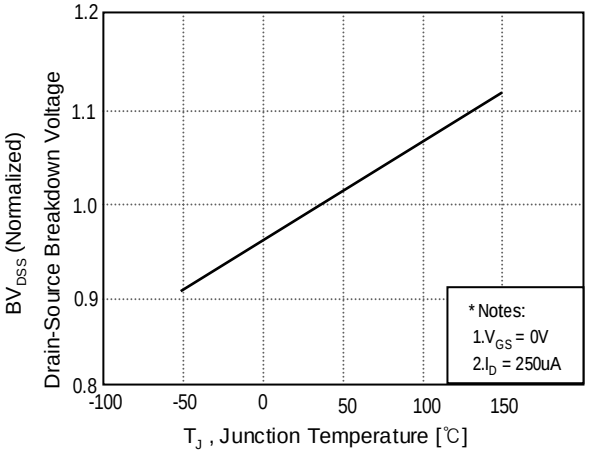


Fig 7. Breakdown Voltage Variation

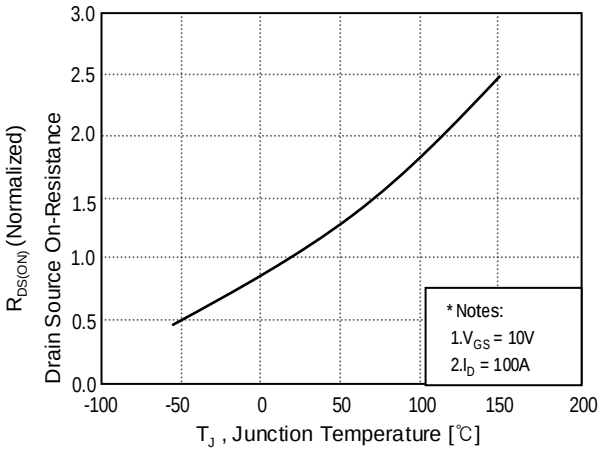


Fig 8. On-Resistance Variation

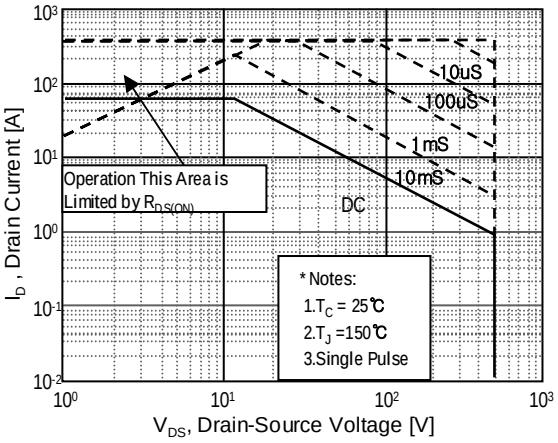


Fig 9. Maximum Safe Operating Area

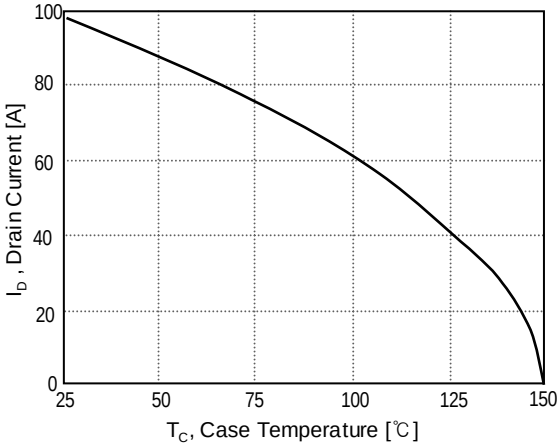


Fig 10. Maximum Drain Current vs. Case Temperature

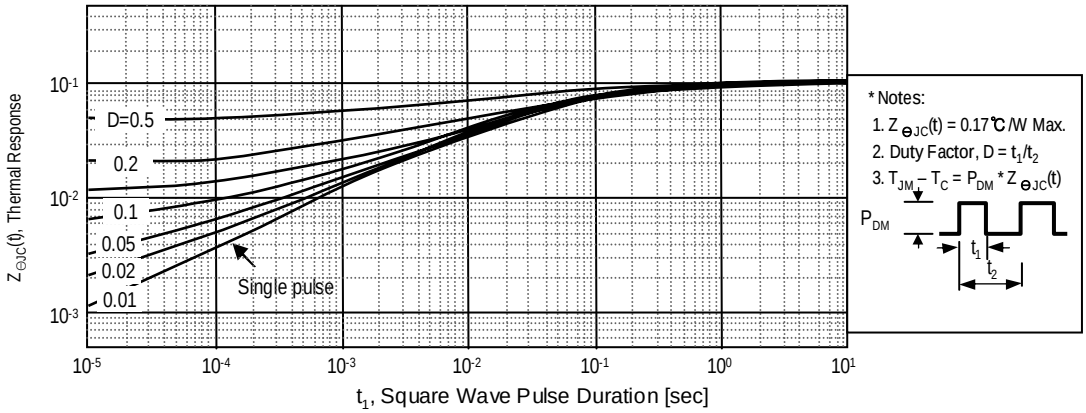
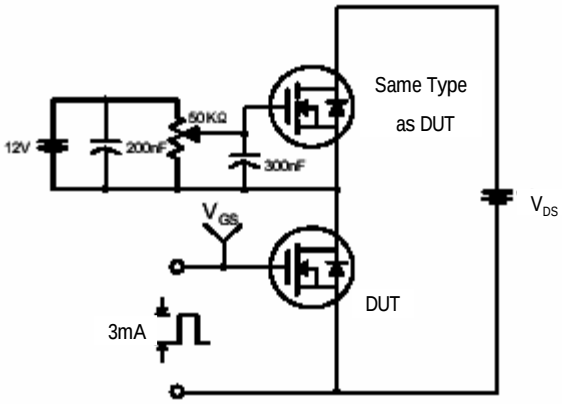
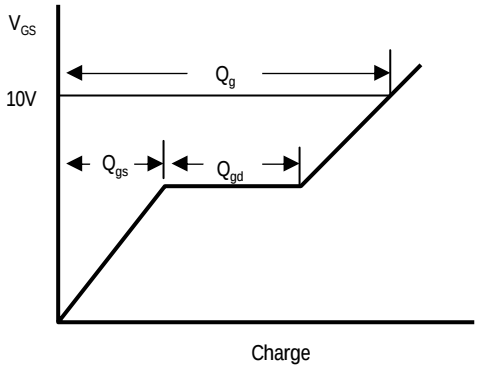


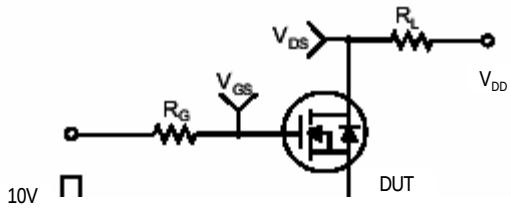
Fig 11. Transient Thermal Response Curve

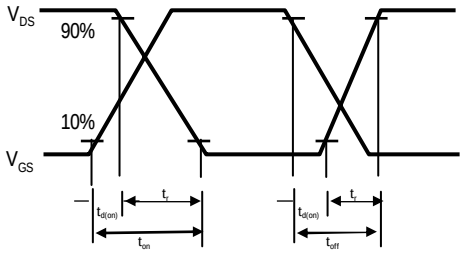
Gate Charge Test Circuit & Waveform



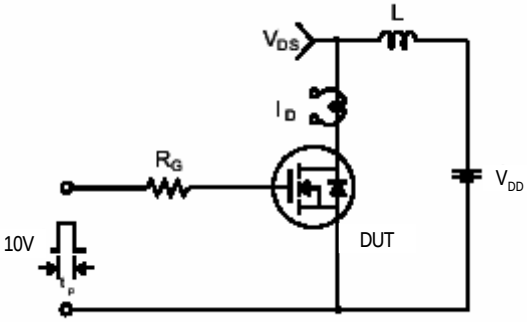


Resistive Switching Test Circuit & Waveforms

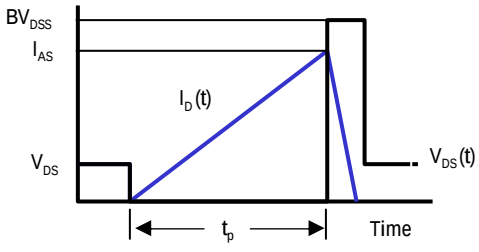




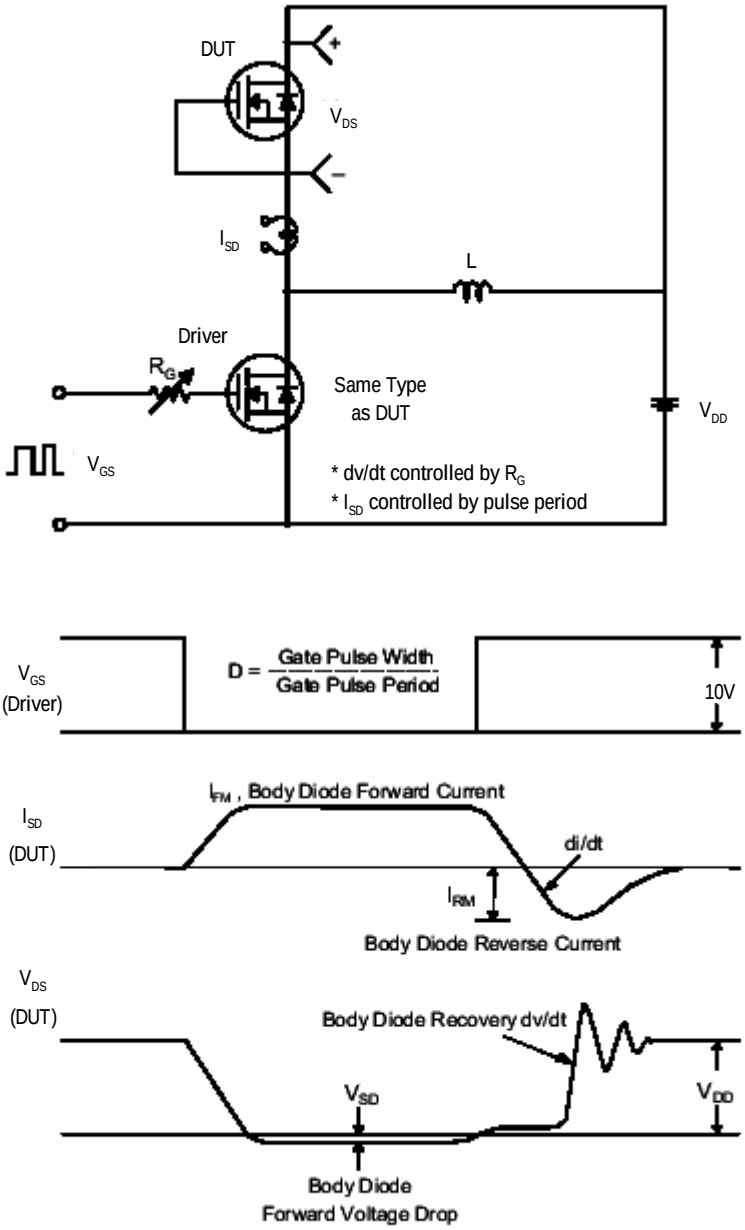
Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

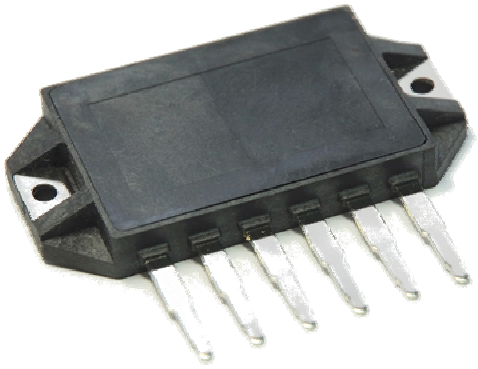


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Out Line Information

6DM-2



Dimensions in mm