

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.

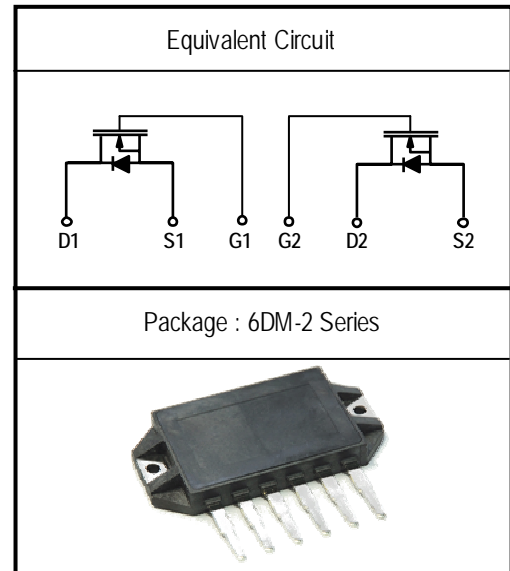
Features

- ☞ $R_{DS(ON)} = 0.12\Omega$ Max. @ $V_{GS}=10V, I_D=50A$
- ☞ Gate Charge = 105nC(typ.)
- ☞ Improved dv/dt Capability, High Ruggedness
- ☞ Maximum Junction Temperature Range = 150 °C
- ☞ 100% avalanche tested
- ☞ Isolation Type Package

Applications

High efficient SMPS, Active PFC

Equivalent Circuit and Package



Please see the package out line information

Absolute Maximum Ratings @ $T_j=25^\circ\text{C}$ (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	$T_c = 25^\circ\text{C}$	50	A
		$T_c = 100^\circ\text{C}$	30	A
$I_{DM(1)}$	Pulsed Drain Current (Note 1)	-	200	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	-	2800	mJ
E_{AR}	Repetitive Avalanche Energy (Note 1)	-	74	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	-	4.5	V/ns
P_D	Maximum Power Dissipation	$T_c = 25^\circ\text{C}$	560	W
T_j	Operating Junction Temperature	-	-40 ~ 150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-	-40 ~ 125	$^\circ\text{C}$
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	$^\circ\text{C}$

Electrical Characteristics of MOSFET @ $T_C=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Conditions	Values			Units
			Min.	Typ.	Max.	
Off Characteristics						
BV_{DSS}	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	500	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	-	0.5	-	V/ $^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS} = 500V, V_{GS} = 0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GE} = \pm 30V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	-	5.0	V
$R_{DS(on)}$	Static Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 25A$		0.09	0.12	Ω
g_s	Forward Transconductance	$V_{DS} = 40V, I_D = 25A$	-	20	-	S
Dynamic Characteristics						
C_{iss}	Input capacitance	$V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$	-	6000	-	pF
C_{oss}	Output capacitance		-	900	-	
C_{rss}	Reverse transfer capacitance		-	100	-	
$t_d(on)$	Turn-on delay time	$V_{DD} = 250V, I_D = 50A$ $R_G = 25\Omega$ (Note 4,5)	-	105	-	ns
t_r	Turn-on rise time		-	360	-	
$t_d(off)$	Turn-off delay time		-	225	-	
t_f	Turn-off fall time		-	230	-	
Q_g	Total Gate Charge	$V_{DS} = 400V$ $V_{GS} = 10V$ $I_D = 50A$ (Note 4, 5)	-	105	-	nC
Q_{gs}	Gate-Source Charge		-	33	-	
Q_{gd}	Gate-Drain Charge (Miller Charge)		-	45	-	

Electrical Characteristics of FRD @ $T_C=25^\circ\text{C}$ (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	-	-	50	A
I_{SM}	Pulsed Source Current		-	-	200	
V_{SD}	Diode Forward Voltage	$I_S=50\text{A}, V_{GS}=0\text{V}$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$I_S=50\text{A}, V_{GS}=0\text{V},$ $di_F/dt=100\text{A}/\mu\text{s}$	-	580	-	ns
Q_{rr}	Reverse Recovery Charge		-	10	-	μC

Thermal Characteristics and Weight

Symbol	Parameter	Conditions	Values			Unit
			Min.	Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		-	-	0.22	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink		0.1	-	-	$^\circ\text{C}/\text{W}$
Weight	Weight of Module		-	-	30	g

※ NOTES

1. Repetitive rating : pulse width limited by junction temperature
2. $L=1.46\text{mH}, I_{AS}=50\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, starting $T_J=25^\circ\text{C}$
3. $I_{SD} \leq 50\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, starting $T_J=25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300/\mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially independent of operating temperature

Performance Curves

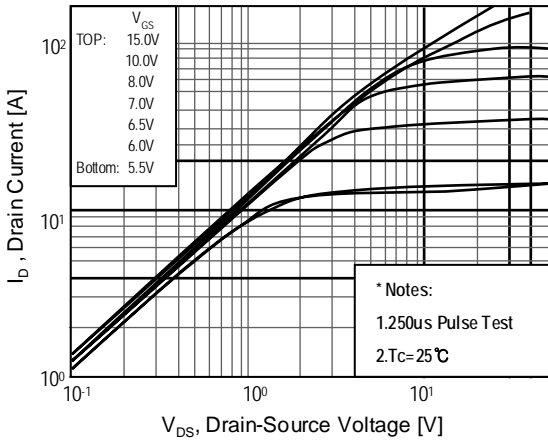


Fig 1. On - Region Characteristics

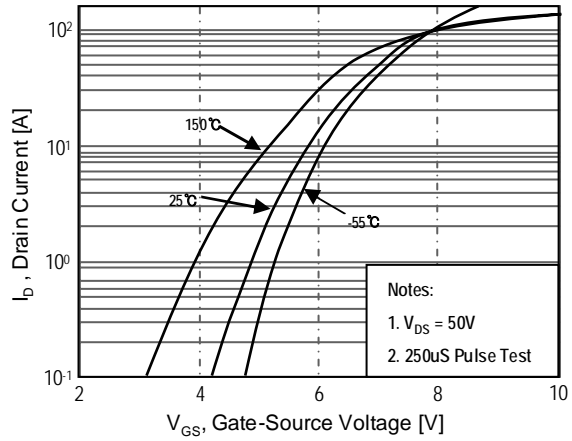


Fig 2. Transfer Characteristics

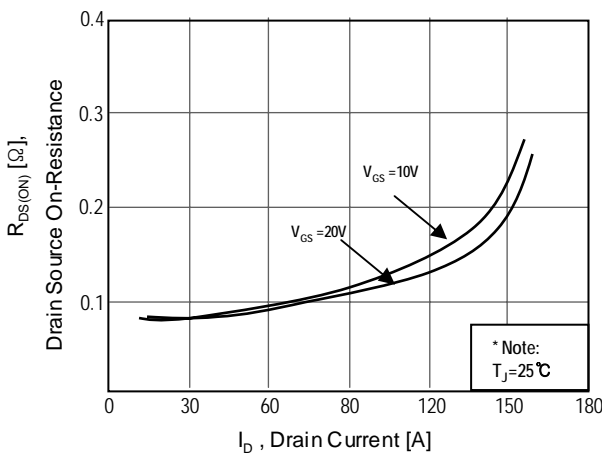


Fig 3. On - Resistance Variation vs. Drain Current and Gate Voltage

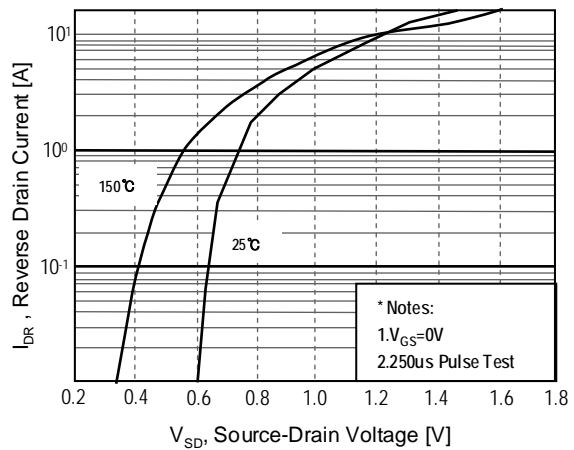


Fig 4. Body Diode Forward Voltage Variation vs. Source Current and Temp.

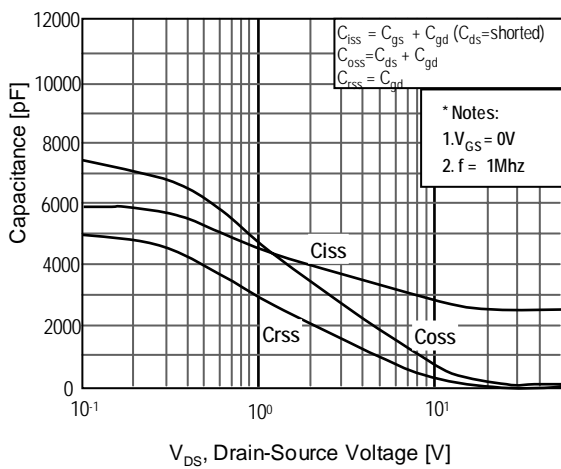


Fig 5. Capacitance Characteristics

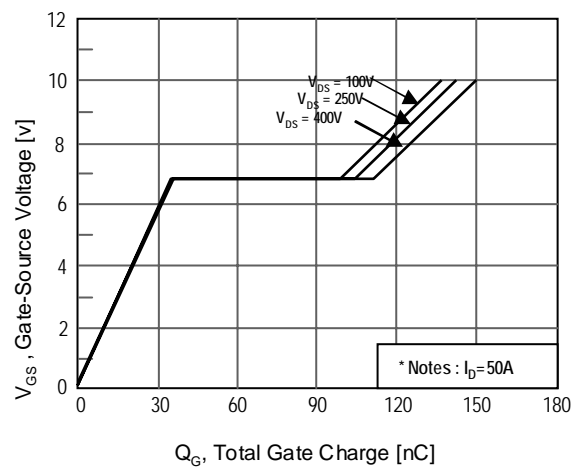


Fig 6. Gate Charge Characteristics

Performance Curves (Continued)

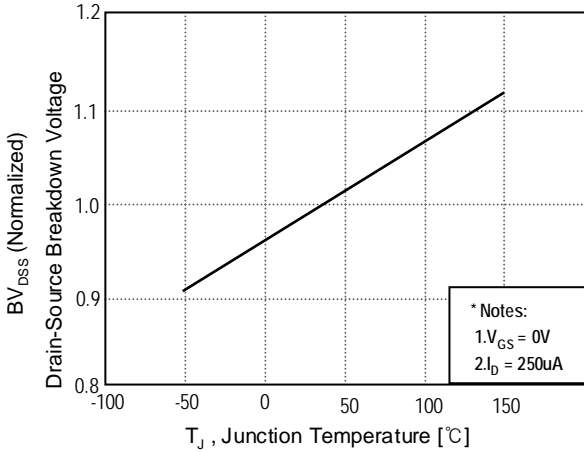


Fig 7. Breakdown Voltage Variation

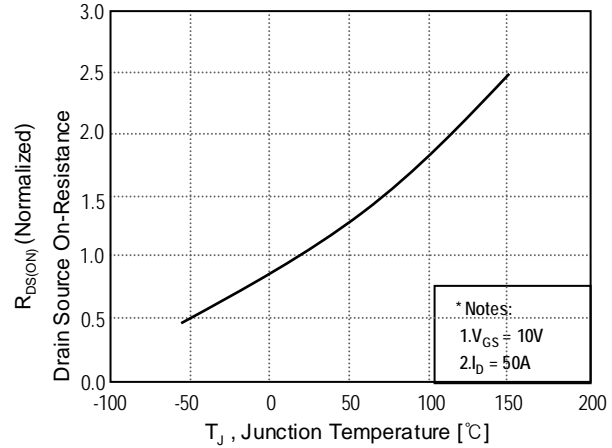


Fig 8. On-Resistance Variation

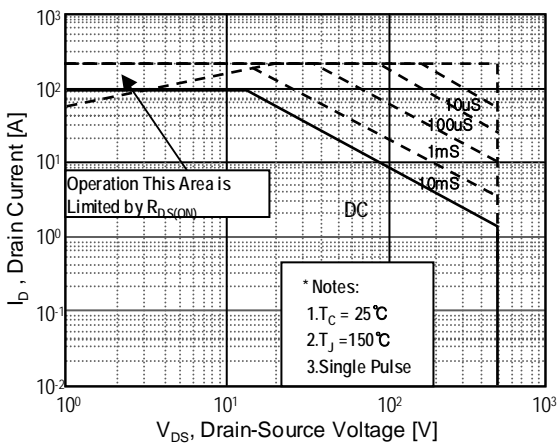


Fig 9. Maximum Safe Operating Area

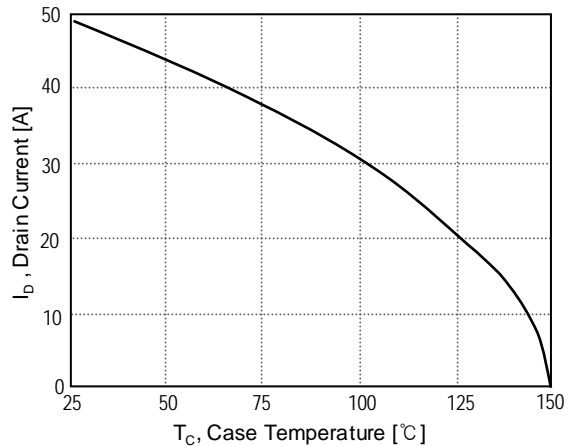


Fig 10. Maximum Drain Current vs. Case Temperature

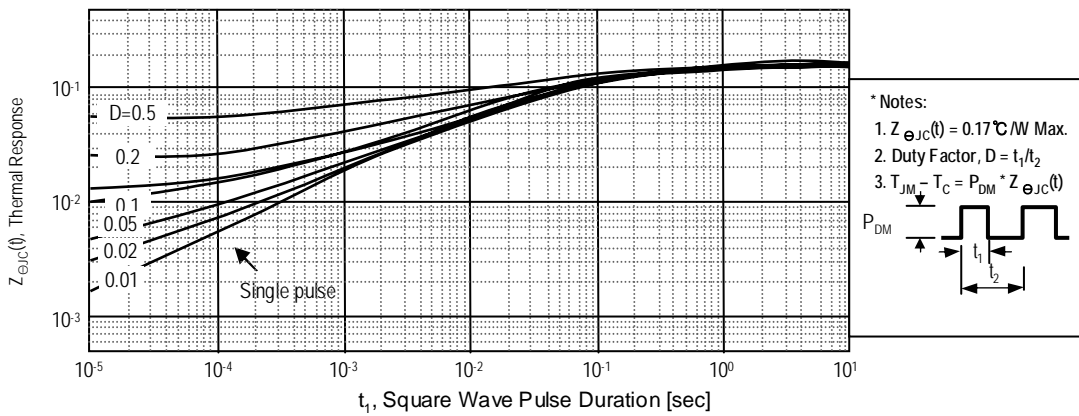
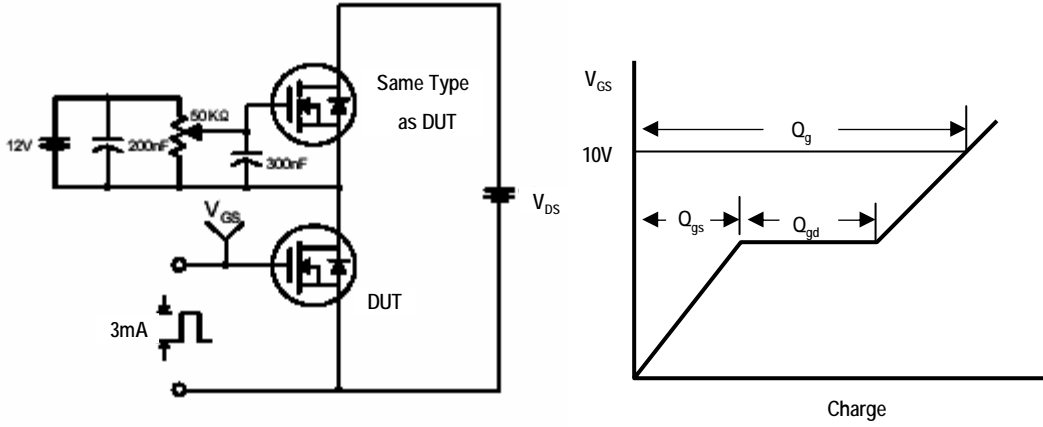
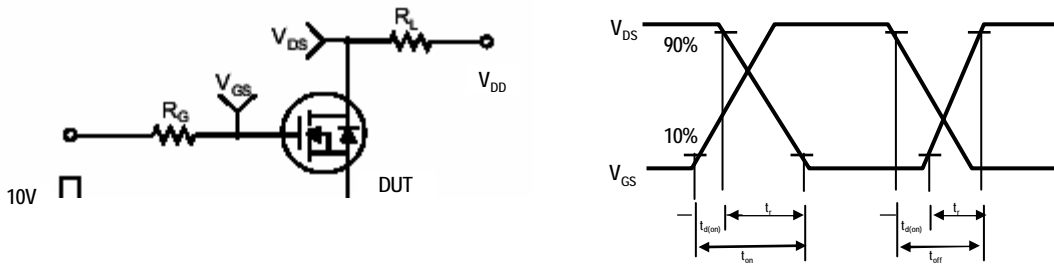


Fig 11. Transient Thermal Response Curve

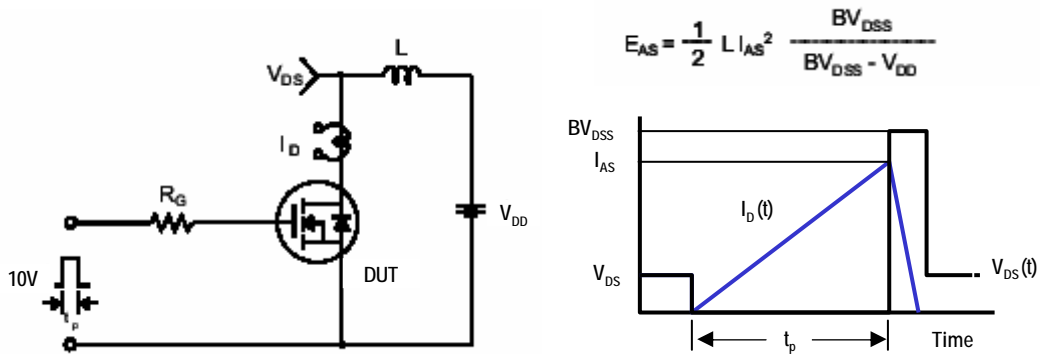
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

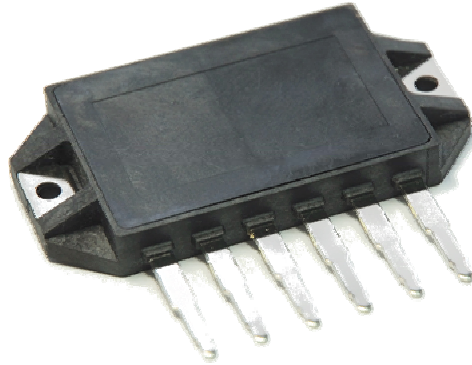


Unclamped Inductive Switching Test Circuit & Waveforms



Package Out Line Information

6DM-2



Dimensions in mm

