

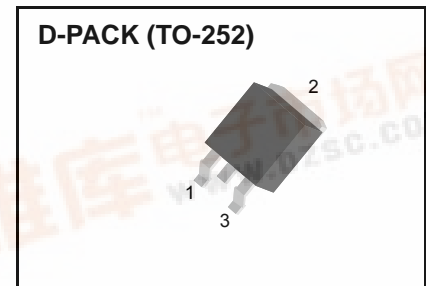
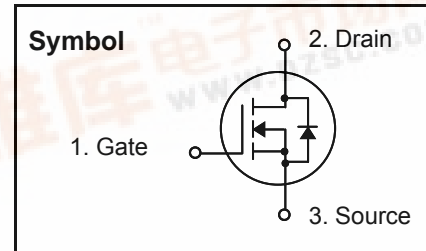
Logic N-Channel MOSFET

Features

- Low $R_{DS(on)}$ (0.018Ω) @ $V_{GS}=10V$
- Low Gate Charge (Typical 17.5nC)
- Low C_{rss} (Typical 110pF)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Maximum Junction Temperature Range ($150^{\circ}C$)

General Description

This Power MOSFET is produced using SemiWell's advanced planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a low gate charge with superior switching performance, and rugged avalanche characteristics. This Power MOSFET is well suited for synchronous DC-DC Converters and Power Management in portable and battery operated products.



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain to Source Voltage	30	V
I_D	Continuous Drain Current (@ $T_C = 25^{\circ}C$)	37	A
	Continuous Drain Current (@ $T_C = 100^{\circ}C$)	24	A
I_{DM}	Drain Current Pulsed (Note 1)	148	A
V_{GS}	Gate to Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	220	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	7.0	V/ns
P_D	Total Power Dissipation (@ $T_A = 25^{\circ}C$)	2.5	W
	Total Power Dissipation (@ $T_C = 25^{\circ}C$)	45	W
	Derating Factor above $25^{\circ}C$	0.36	W/ $^{\circ}C$
T_{STG}, T_J	Operating Junction Temperature & Storage Temperature	- 55 ~ 150	$^{\circ}C$
T_L	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300	$^{\circ}C$

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min.	Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	-	2.78	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient *	-	-	50	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	-	110	$^{\circ}C/W$

* When mounted on the minimum pad size recommended (PCB Mount)

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Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	30	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature coefficient	$I_D = 250\mu A$, referenced to 25°C	-	0.03	-	$V/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	μA
		$V_{DS} = 24V, T_C = 125^\circ\text{C}$	-	-	10	μA
I_{GSS}	Gate-Source Leakage, Forward	$V_{GS} = 20V, V_{DS} = 0V$	-	-	100	nA
	Gate-Source Leakage, Reverse	$V_{GS} = -20V, V_{DS} = 0V$	-	-	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	-	3.0	V
$R_{DS(ON)}$	Static Drain-Source On-state Resistance	$V_{GS} = 10V, I_D = 18.5A$	-	0.013	0.018	Ω
		$V_{GS} = 5V, I_D = 18.5A$	-	0.017	0.025	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$	-	880	1140	pF
C_{oss}	Output Capacitance		-	370	480	
C_{rss}	Reverse Transfer Capacitance		-	110	140	
Dynamic Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15V, I_D = 22.5A, R_G = 50\Omega$ * see fig. 13. (Note 4, 5)	-	20	50	ns
t_r	Rise Time		-	60	130	
$t_{d(off)}$	Turn-off Delay Time		-	45	100	
t_f	Fall Time		-	60	130	
Q_g	Total Gate Charge	$V_{DS} = 24V, V_{GS} = 5V, I_D = 45A$ * see fig. 12. (Note 4, 5)	-	17.5	23	nC
Q_{gs}	Gate-Source Charge		-	5.0	-	
Q_{gd}	Gate-Drain Charge(Miller Charge)		-	7.5	-	

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
I_S	Continuous Source Current	Integral Reverse p-n Junction Diode in the MOSFET	-	-	37	A
I_{SM}	Pulsed Source Current		-	-	148	
V_{SD}	Diode Forward Voltage	$I_S = 37A, V_{GS} = 0V$	-	-	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 45A, V_{GS} = 0V, di_F/dt = 100A/\mu s$	-	35	-	ns
Q_{rr}	Reverse Recovery Charge		-	30	-	nC

* NOTES

1. Repeatability rating : pulse width limited by junction temperature
2. $L = 160\mu H, I_{AS} = 37A, V_{DD} = 15V, R_G = 0\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $ISD \leq 45A, di/dt \leq 300A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
5. Essentially independent of operating temperature.



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Fig 1. On-State Characteristics

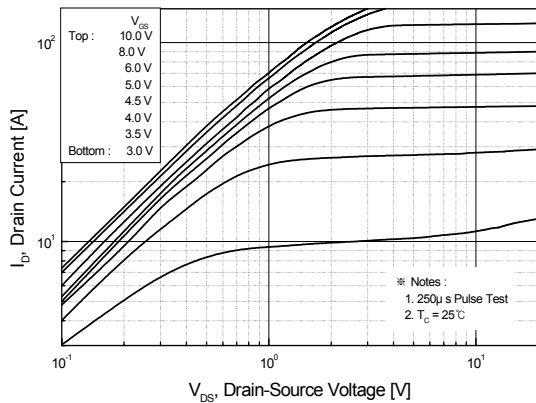


Fig 2. Transfer Characteristics

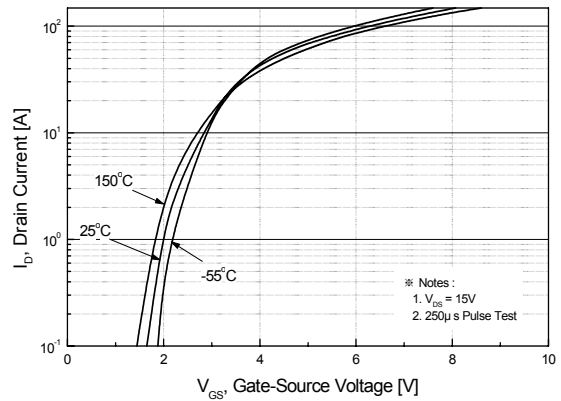


Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

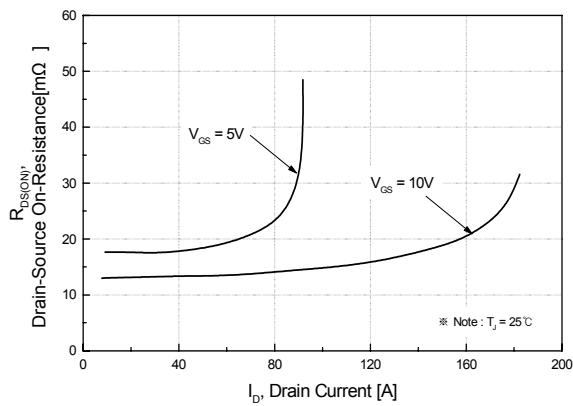


Fig 4. On State Current vs. Allowable Case Temperature

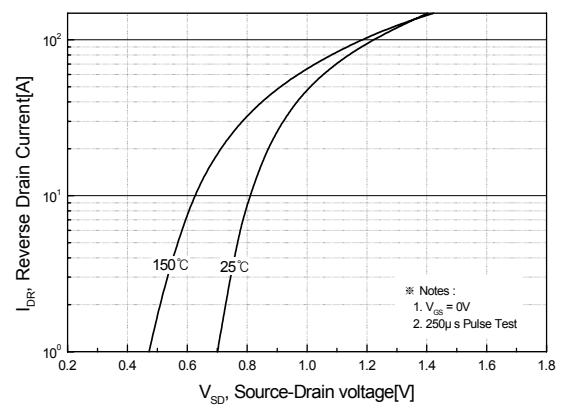


Fig 5. Capacitance Characteristics

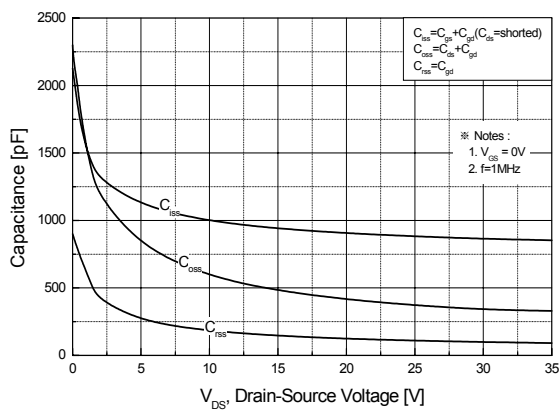
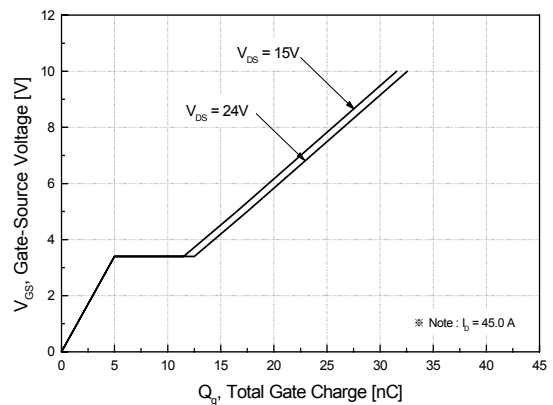


Fig 6. Gate Charge Characteristics



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Fig 7. Breakdown Voltage Variation vs. Junction Temperature

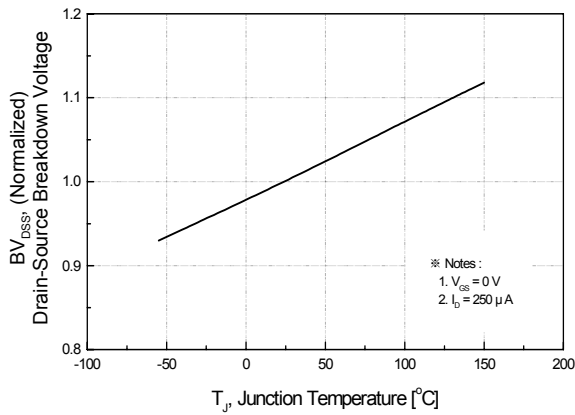


Fig 8. On-Resistance Variation vs. Junction Temperature

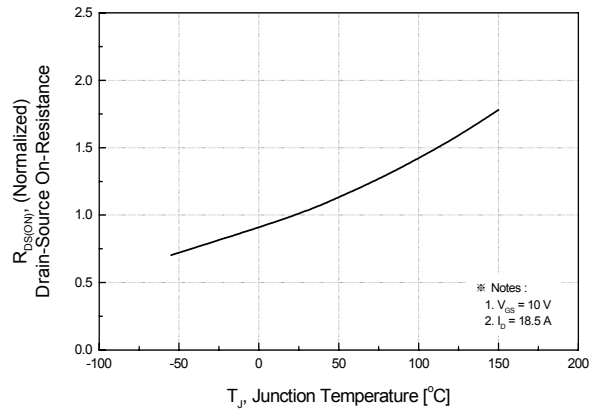


Fig 9. Maximum Safe Operating Area

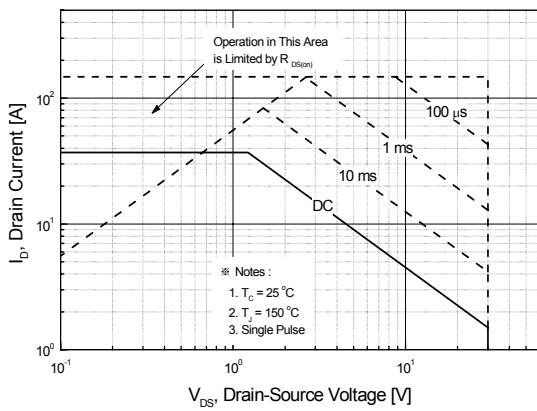


Fig 10. Maximum Drain Current vs. Case Temperature

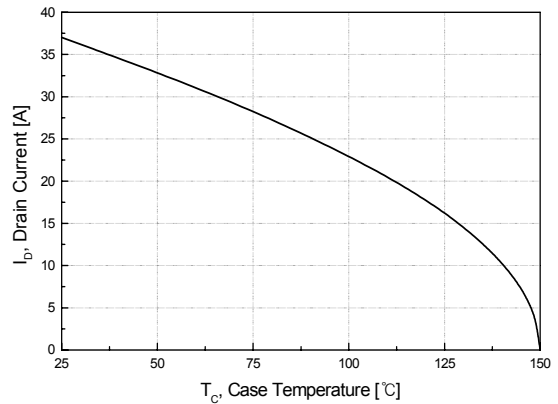


Fig 11. Transient Thermal Response Curve

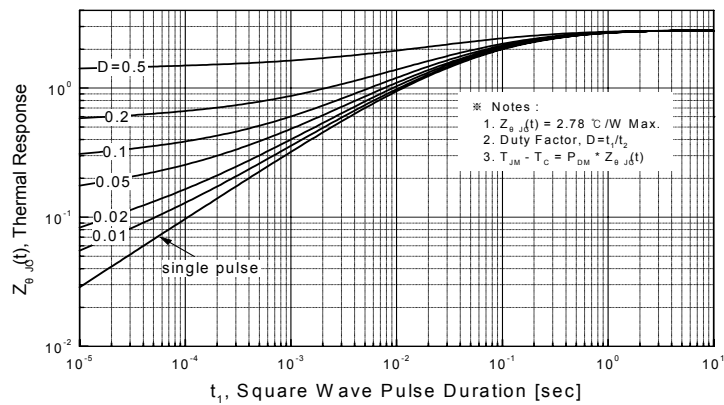


Fig. 12. Gate Charge Test Circuit & Waveforms

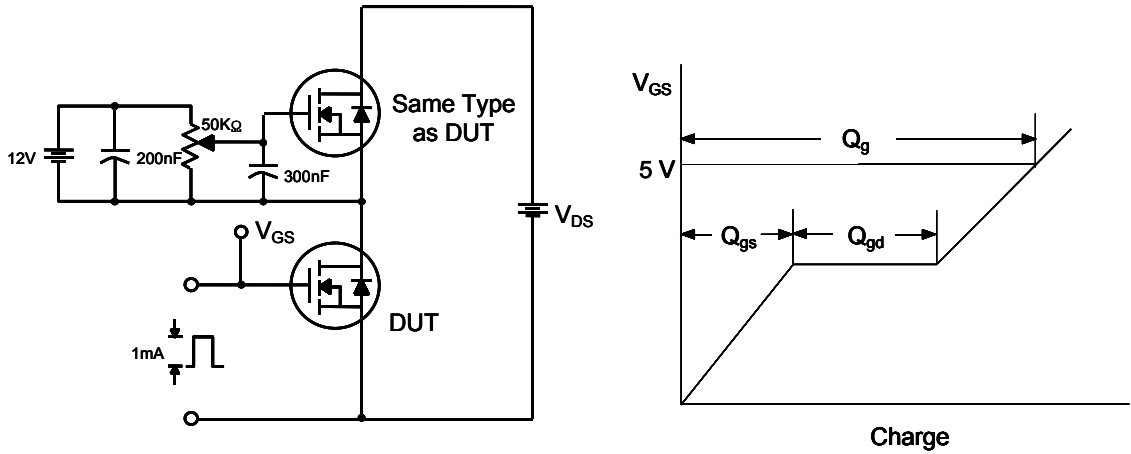


Fig 13. Switching Time Test Circuit & Waveforms

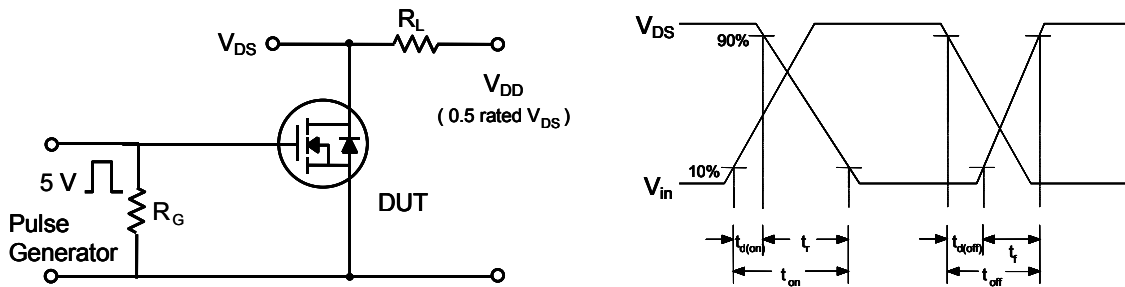
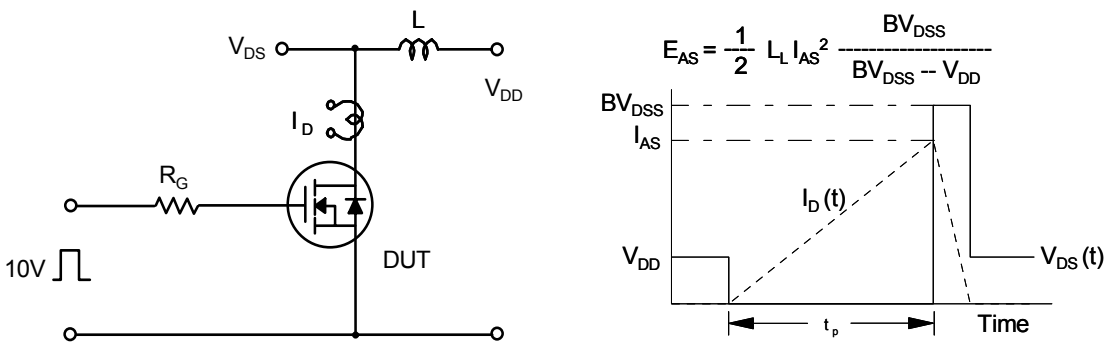
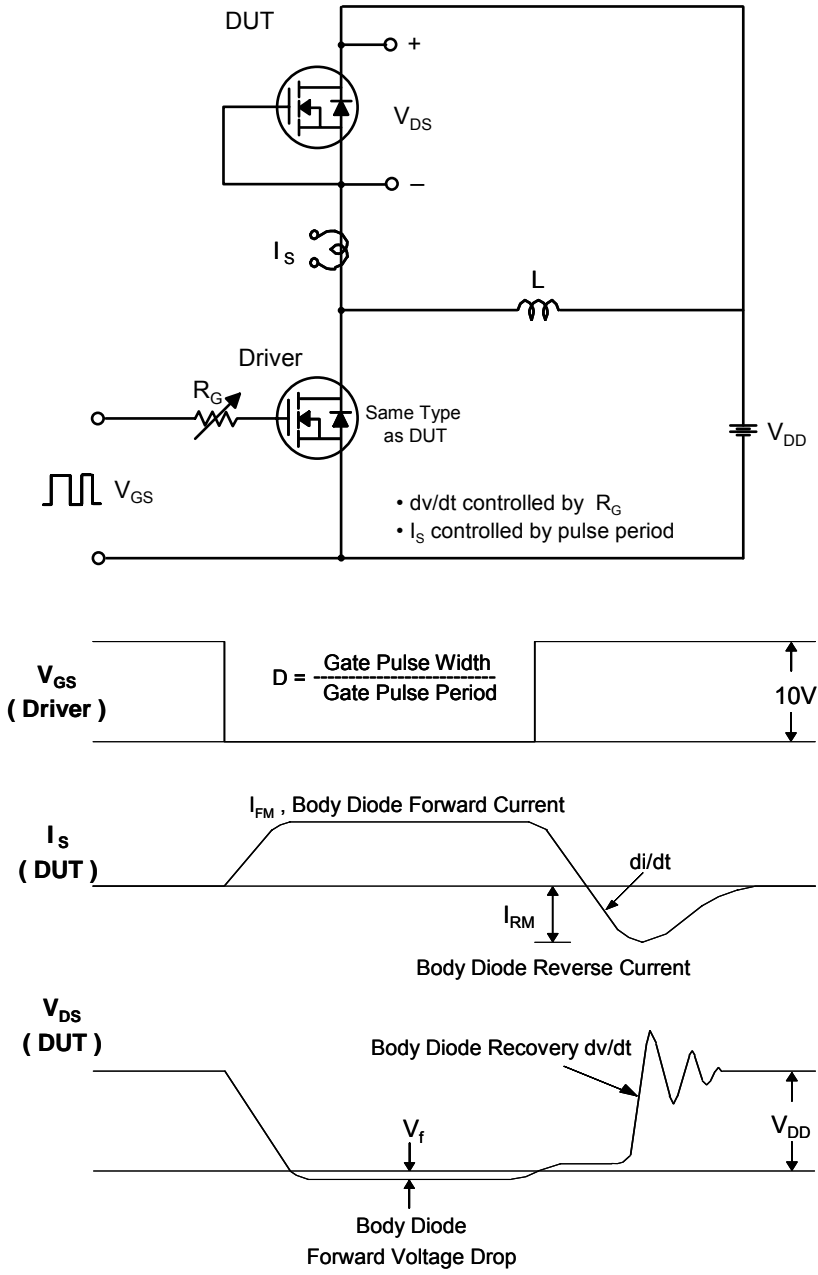


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms



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Fig. 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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TO-252(D-PAK) Package Dimension

Dim.	mm			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.48	6.604	6.73	0.255	0.26	0.265
B	5.0	5.08	5.21	0.197	0.2	0.205
C	7.42	7.8	8.18	0.292	0.307	0.322
D	2.184	2.286	2.388	0.086	0.09	0.094
E	0.762	0.813	0.864	0.03	0.032	0.034
F	1.016	1.067	1.118	0.04	0.042	0.044
G		2.286			0.09	
H		2.286			0.09	
I	0.534	0.61	0.686	0.021	0.024	0.027
J	1.016	1.067	1.118	0.04	0.042	0.044
K		0.508			0.02	
L		0.762			0.03	
ϕ		1.57			0.06	

