

## Dual N-Channel Advanced Power MOSFET

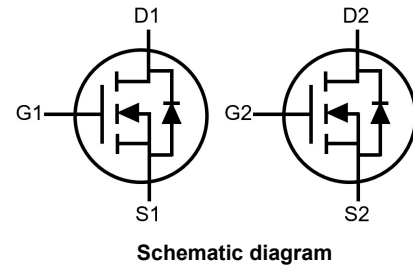
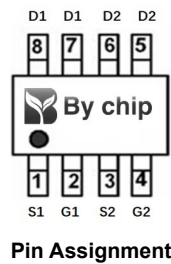
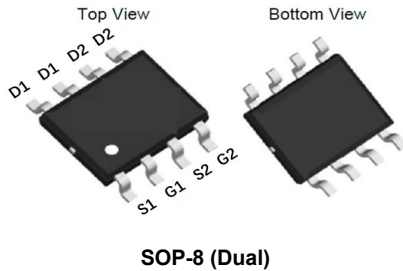
### Features

- $V_{DS} = 60V$ ,  $I_D = 5A$   
 $R_{DS(ON)} < 30\text{ m}\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(ON)} < 36\text{ m}\Omega$  @  $V_{GS} = 4.5V$

### General Features

- Advanced Trench Technology
- Provide Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead Free and Green Available

100% UIS TESTED!  
 100%  $\Delta V_{ds}$  TESTED!



### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Max.	Units
$V_{DSS}$	Drain-Source Voltage	60	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_A = 25^\circ\text{C}$	5
		$T_A = 100^\circ\text{C}$	3.3
$I_{DM}$	Pulsed Drain Current <sup>note1</sup>	20	A
EAS	Single Pulsed Avalanche Energy <sup>note2</sup>	20	mJ
$P_D$	Power Dissipation	$T_A = 25^\circ\text{C}$	1.74
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	72	$^\circ\text{C}/\text{W}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V,$	-	-	1.0	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0		2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=10V, I_D=5A$	-		30	m $\Omega$
		$V_{GS}=4.5V, I_D=3A$	-		36	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$	-	853	-	pF
$C_{oss}$	Output Capacitance		-	60	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	29	-	pF
$Q_g$	Total Gate Charge	$V_{DD}=30V, I_D=2.5A,$ $V_{GS}=10V$	-	20	-	nC
$Q_{gs}$	Gate-Source Charge		-	3	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	4.5	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=30V, I_D=5A,$ $R_{GEN}=1.8\Omega, V_{GS}=10V$	-	6	-	ns
$t_r$	Turn-on Rise Time		-	6	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	19	-	ns
$t_f$	Turn-off Fall Time		-	2.5	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	5	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	20	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=5A$	-	-	1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=5A, di/dt=100A/\mu s$	-	13	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge		-	9	-	nC

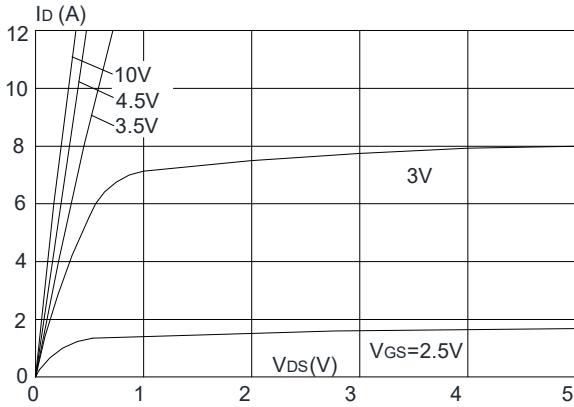
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

 2. EAS condition :Starting  $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_{GS}=10V, L=0.5mH, R_g=25\Omega, I_{AS}=9A$ 

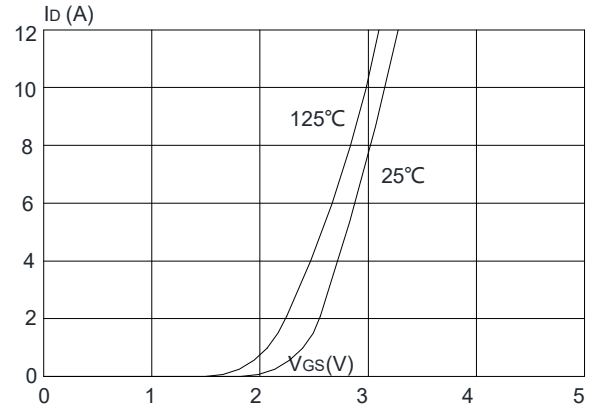
 3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

## Typical Performance Characteristics

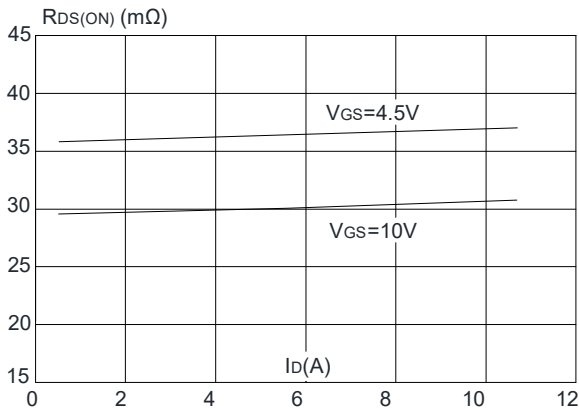
**Figure 1: Output Characteristics**



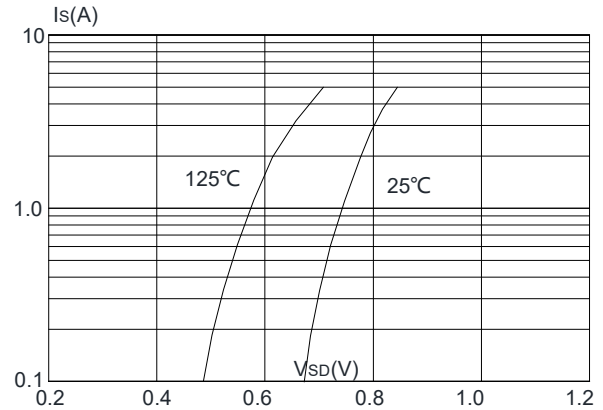
**Figure 2: Typical Transfer Characteristics**



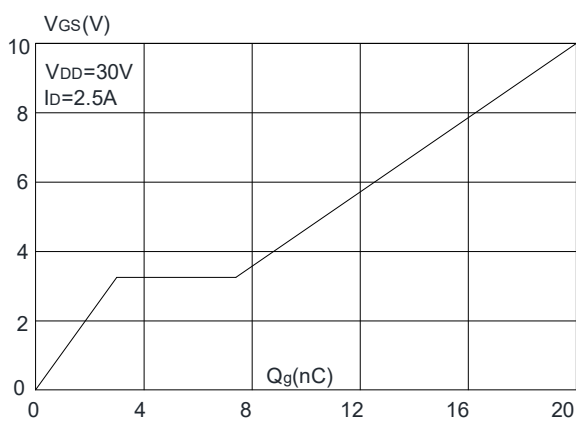
**Figure 3: On-resistance vs. Drain Current**



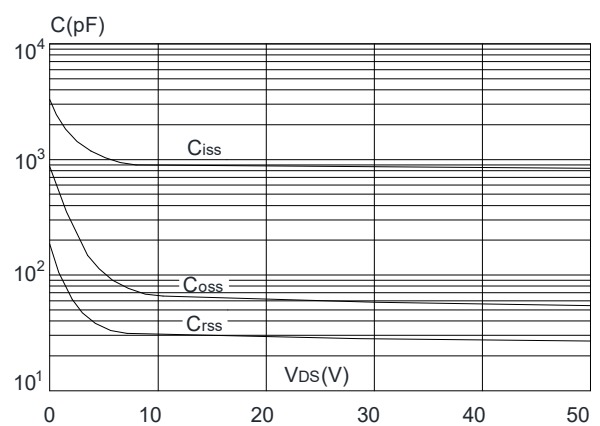
**Figure 4: Body Diode Characteristics**



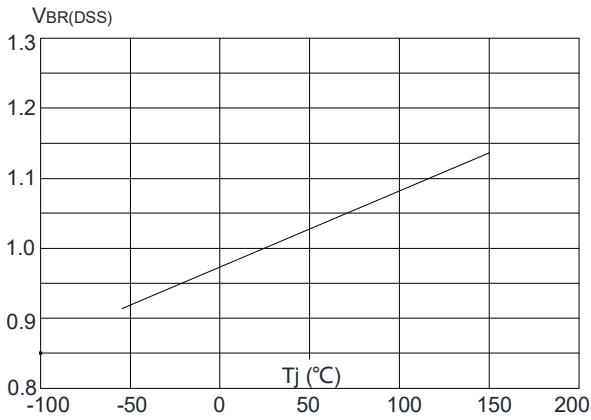
**Figure 5: Gate Charge Characteristics**



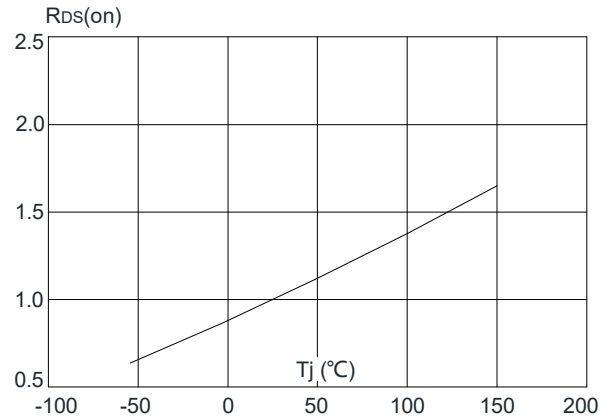
**Figure 6: Capacitance Characteristics**



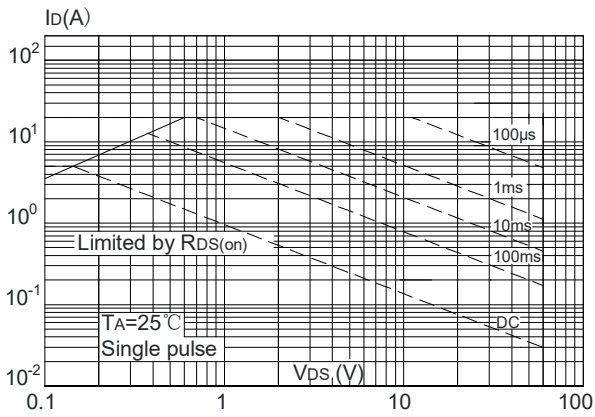
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



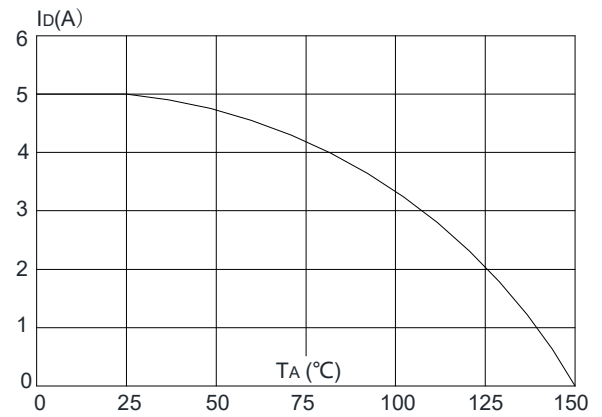
**Figure 8: Normalized on Resistance vs. Junction Temperature**



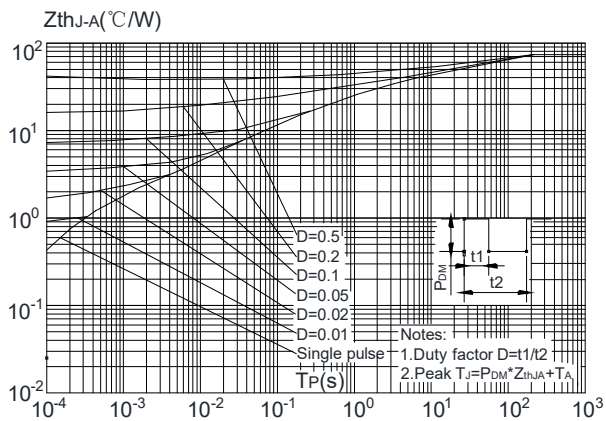
**Figure 9: Maximum Safe Operating Area**



**Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature**



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



### Test Circuit



Figure1:Gate Charge Test Circuit & Waveform

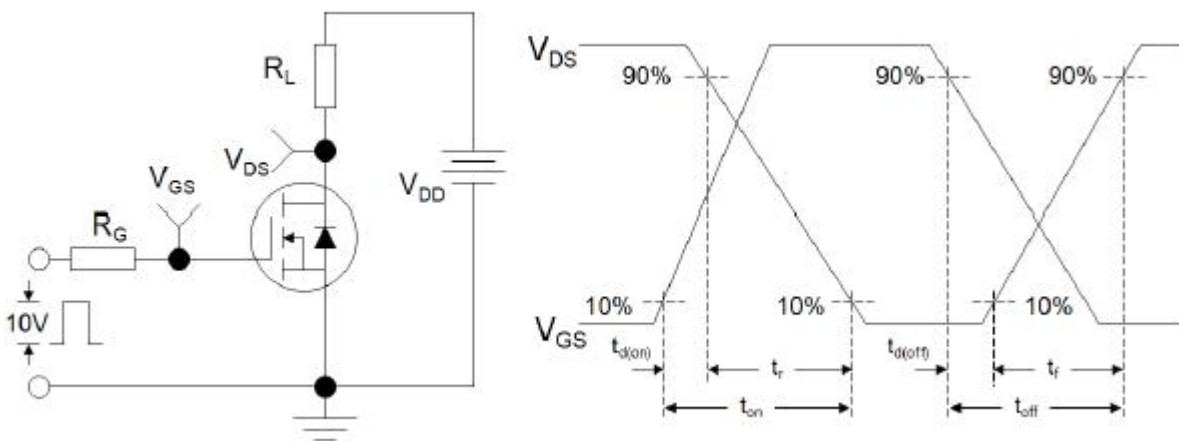


Figure 2: Resistive Switching Test Circuit & Waveforms

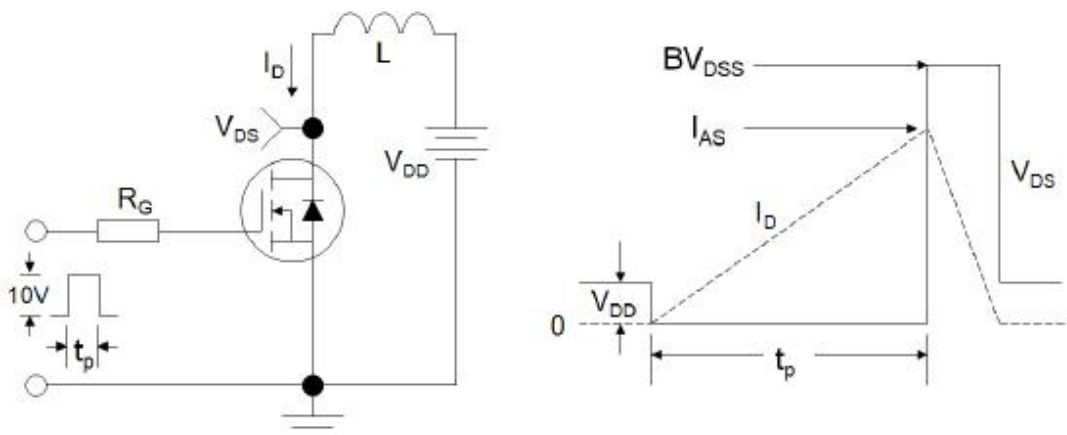


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms