AP4606B

N and P-Channel Enhancement Mosfet

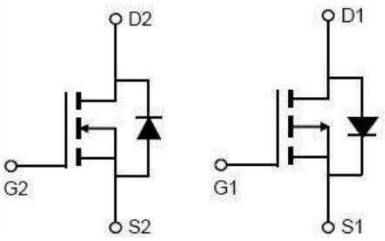
DATA SHEET

Feature

- **N-Channel**
  V_{DD}=30V,I_D=7A
  $R_{DS(ON)}$ <25mΩ @V_{GS}=10V TYP:18 mΩ
  $R_{DS(ON)}$ <38mΩ @V_{GS}=4.5V TYP:25 mΩ

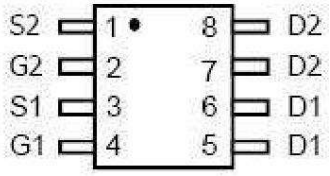
- **P-Channel**
  V_{DD}=-30V,I_D=-5.1A
  $R_{DS(ON)}$ <50mΩ @V_{GS}=-10V TYP:38 mΩ
  $R_{DS(ON)}$ <70mΩ @V_{GS}=-4.5V TYP:53 mΩ

- Lead free product is acquired
- High power and current handing capability
- Surface mount package



N-channel P-channel

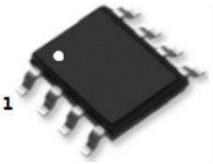
Schematic diagram



Marking and pin assignment

Application

- PWM applications
- Load Switch
- Power management



SOP-8

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
4606B	AP4606B	SOP-8	13 inch	-	4000

ABSOLUTE MAXIMUM RATINGS (T_a=25℃ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current (T_a =25℃)	I_D	7	-5.1	A
Continuous Drain Current (T_a =100℃)	I_D	4.5	-3.3	A
Pulsed Drain Currenr (1)	I_{DM}	28	-20.4	A
Power Dissipation	P_D	2.15	2.15	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	58	58	℃/W
Junction Temperature	T_J	150	150	℃
Storage Temperature	T_{STG}	-55~ +150	-55~ +150	℃

N-CH ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	30			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =30V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage(2)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1	1.5	2.5	V
Drain-source on-resistance(2)	$R_{DS(on)}$	V_{GS} =10V, I_D =5A		18	25	mΩ
		V_{GS} =4.5V, I_D =3A		25	38	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =15V, V_{GS} =0V, f =1MHz		490		pF
Output Capacitance	C_{oss}			79		
Reverse Transfer Capacitance	C_{rss}			61		
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=15V, I_D=3A, R_L=6Ω V_{GS}=10V, R_G=3Ω		4.5		ns
Turn-on rise time	t_r			2.5		
Turn-off delay time	$t_{d(off)}$			14.5		
Turn-off fall time	t_f			3.5		
Total Gate Charge	Qg	VDS=15V, ID=5A, VGS=10V		5.2		nC
Gate-Source Charge	Qgs			0.9		
Gate-Drain Charge	Qgd			1.3		
Source-Drain Diode characteristics						
Diode Forward voltage(2)	V_{DS}	V_{GS} =0V, I_S=7A			1.2	V
Diode Forward current(3)	I_S		-	-	7	A

P-CH ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-30			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-30V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage(2)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1	-1.5	-2.5	V
Drain-source on-resistance(2)	$R_{DS(on)}$	V_{GS} =-10V, I_D =-4A		38	50	mΩ
		V_{GS} =-4.5V, I_D =-3A		53	70	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =-15V, V_{GS} =0V, f =1MHz		580		pF
Output Capacitance	C_{oss}			98		
Reverse Transfer Capacitance	C_{rss}			74		
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=-15V, I_D=-1A, R_L=6Ω V_{GS}=-10V, R_G=1Ω		14		ns
Turn-on rise time	t_r			61		
Turn-off delay time	$t_{d(off)}$			19		
Turn-off fall time	t_f			10		
Total Gate Charge	Qg	VDS=-15V, ID=-4.1A, VGS=-10V		6.8		nC
Gate-Source Charge	Qgs			1		
Gate-Drain Charge	Qgd			1.4		
Source-Drain Diode characteristics						
Diode Forward voltage(2)	V_{DS}	V_{GS} =0V, I_S=-4A			1.2	V
Diode Forward current(3)	I_S		-	-	-5.1	A

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width≤300μs, duty cycle≤2%
3. Surface Mounted on FR4 Board,t≤10 sec

N Test Circuit

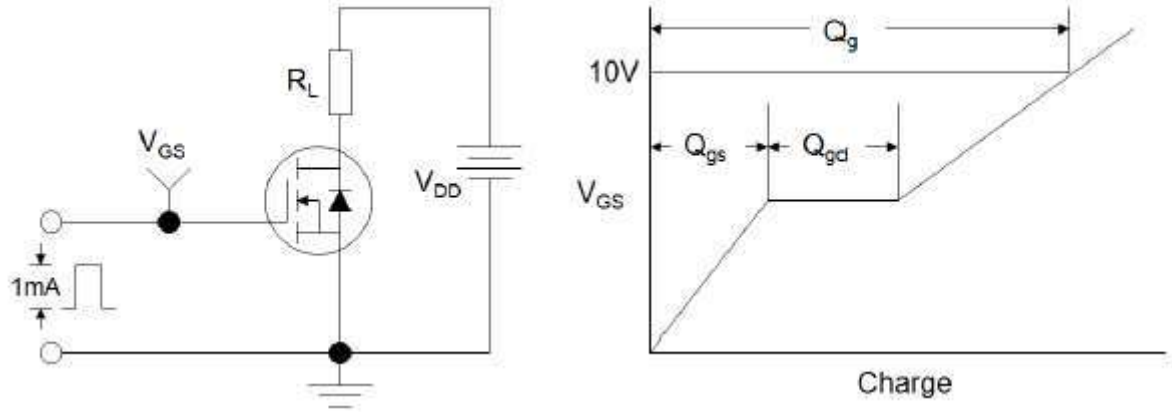


Figure1:Gate Charge Test Circuit & Waveform

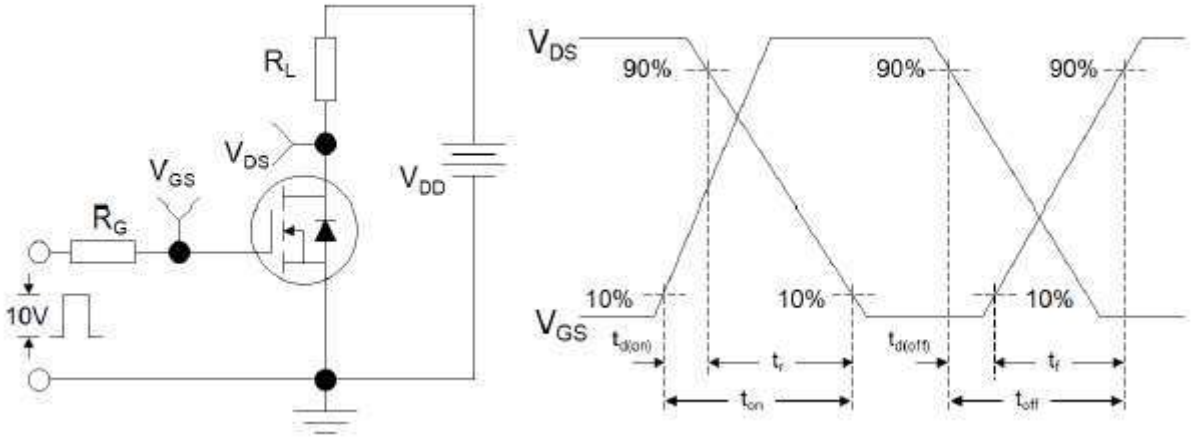


Figure 2: Resistive Switching Test Circuit & Waveforms

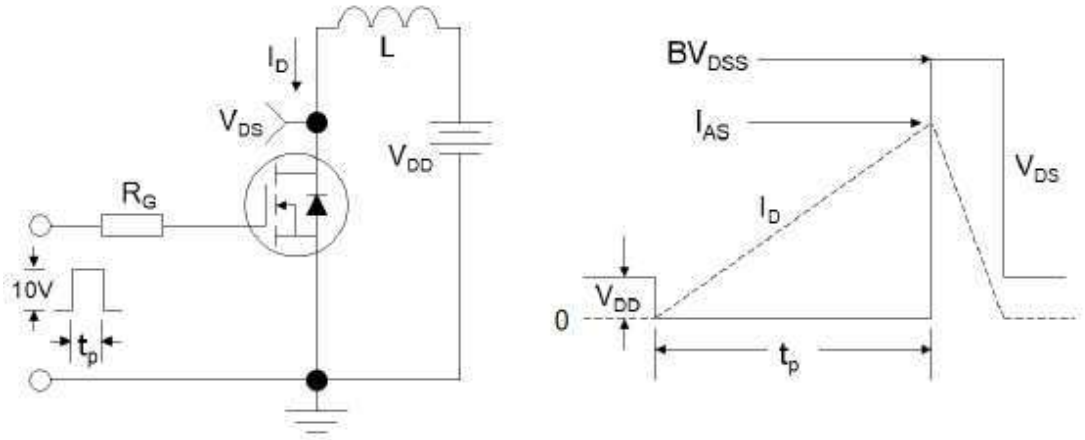


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Figure1: Output Characteristics

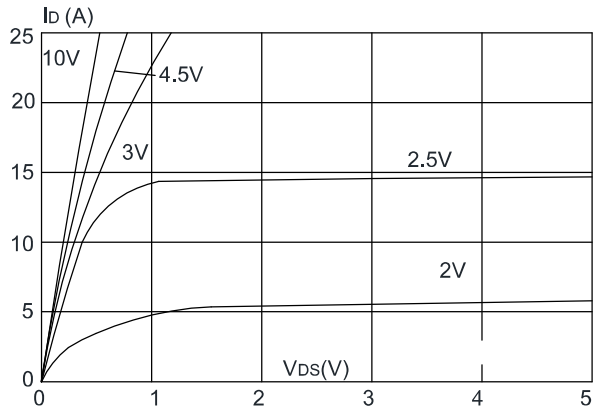


Figure 2: Typical Transfer Characteristics

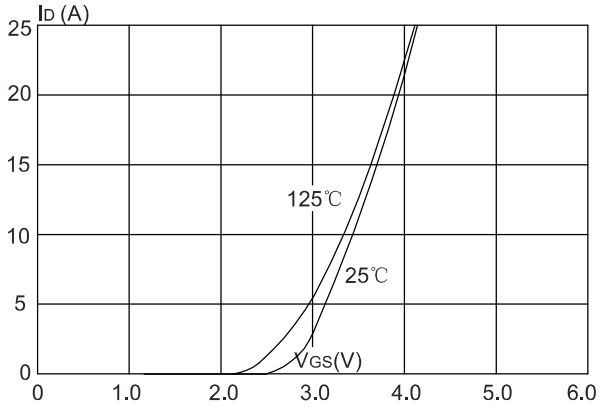


Figure 3: On-resistance vs. Drain Current

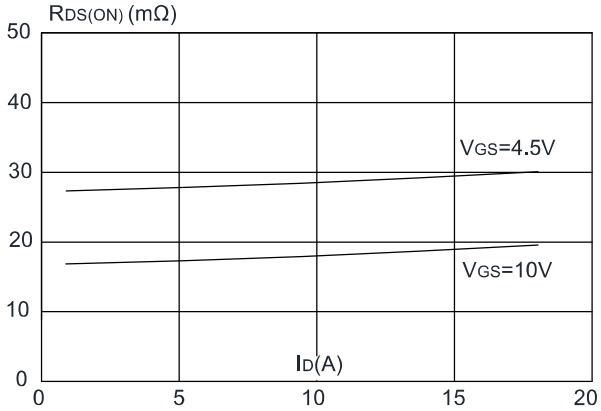


Figure 4: Body Diode Characteristics

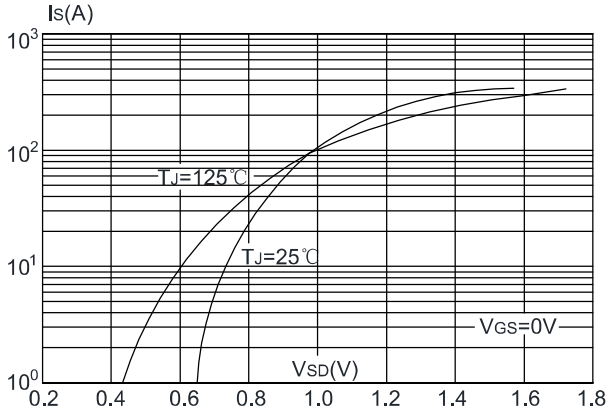


Figure 5: Gate Charge Characteristics

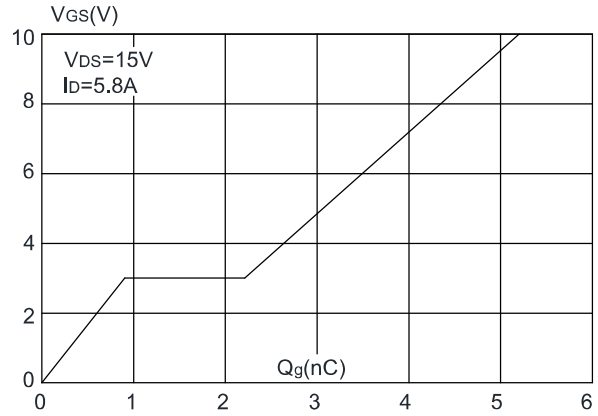


Figure 6: Capacitance Characteristics

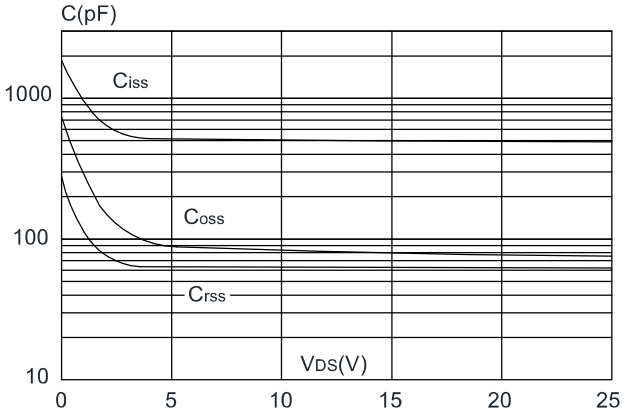


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

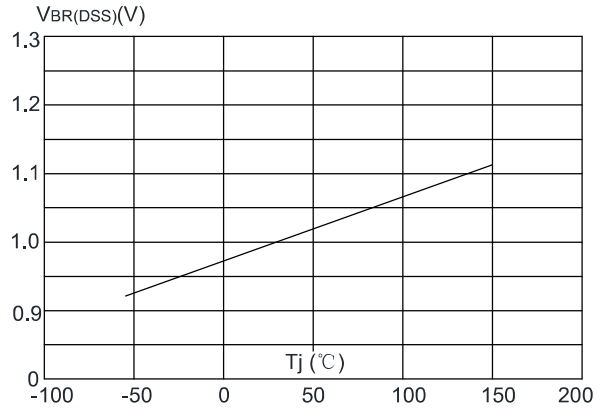


Figure 8: Normalized on Resistance vs. Junction Temperature

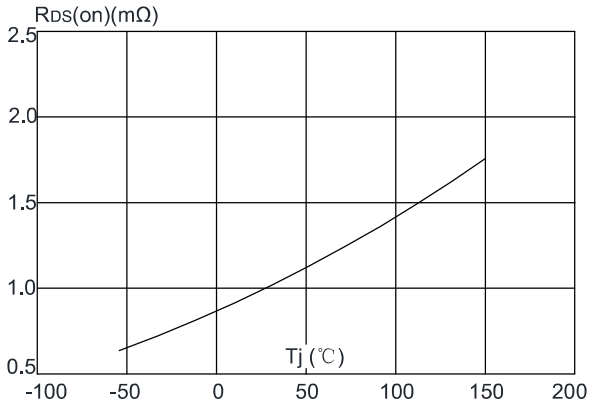


Figure 9: Maximum Safe Operating Area

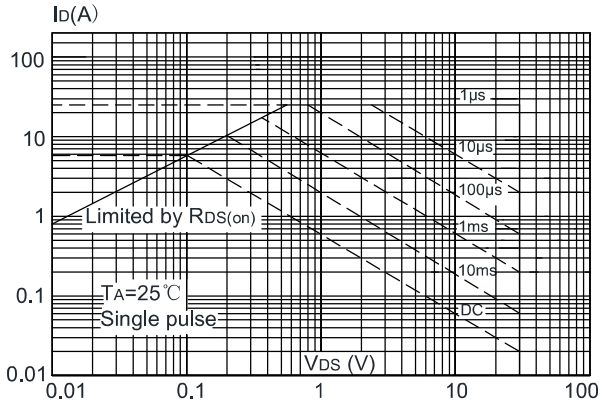


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

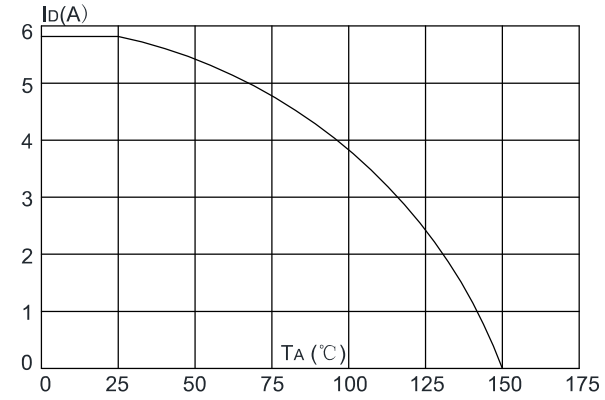
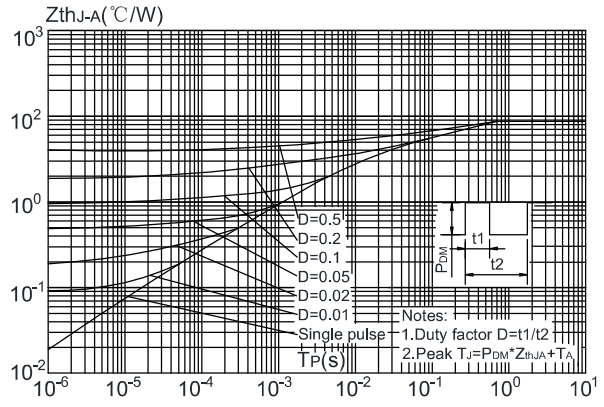
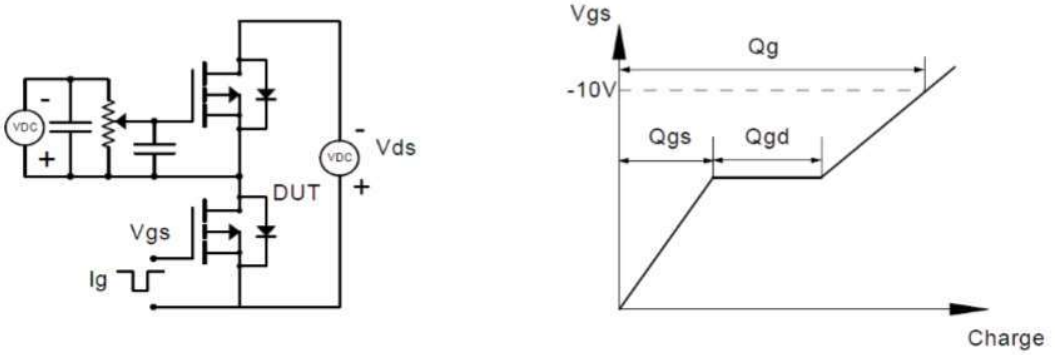


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

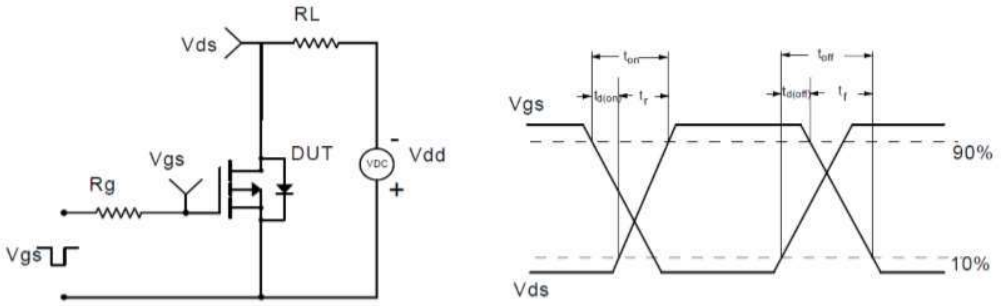


P Typical Performance Characteristics

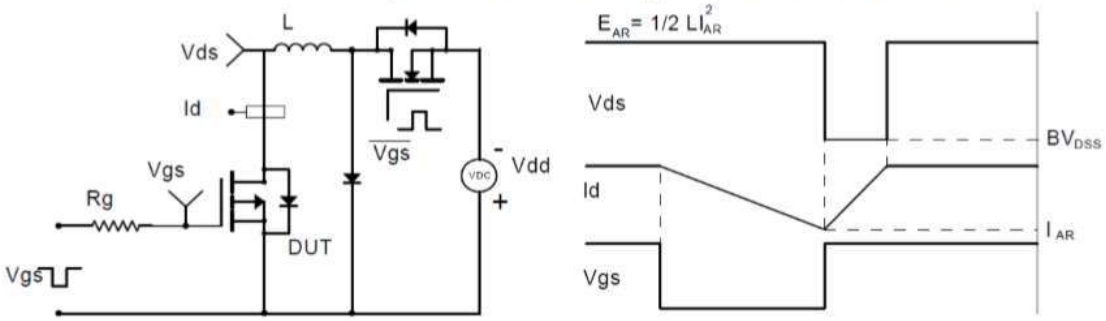
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

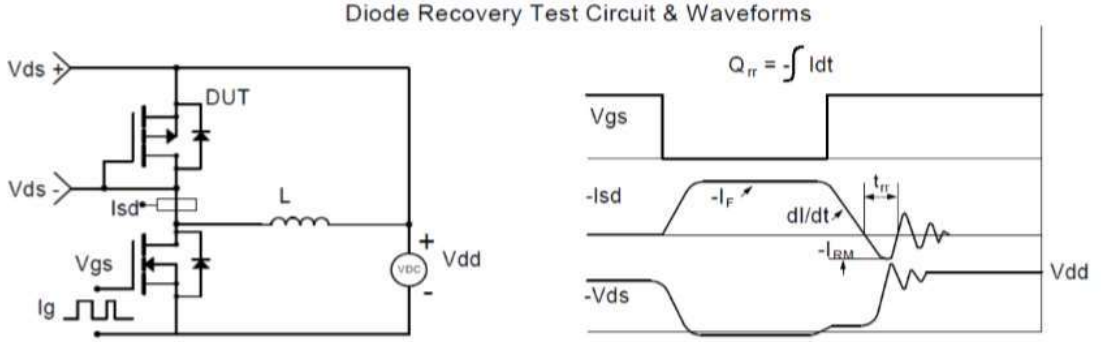


Figure1: Output Characteristics

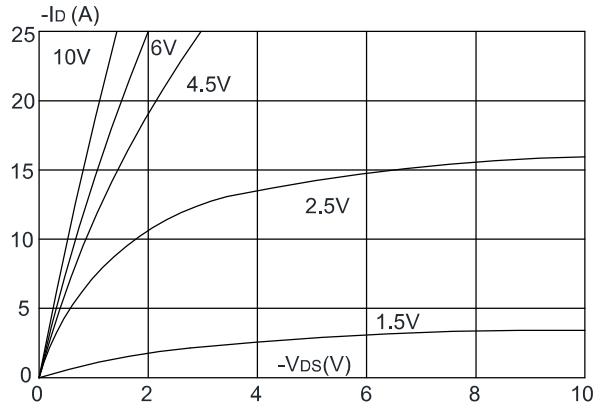


Figure 2: Typical Transfer Characteristics

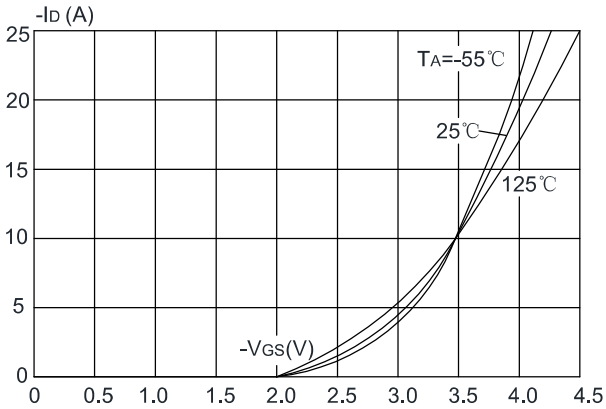


Figure 3: On-resistance vs. Drain Current

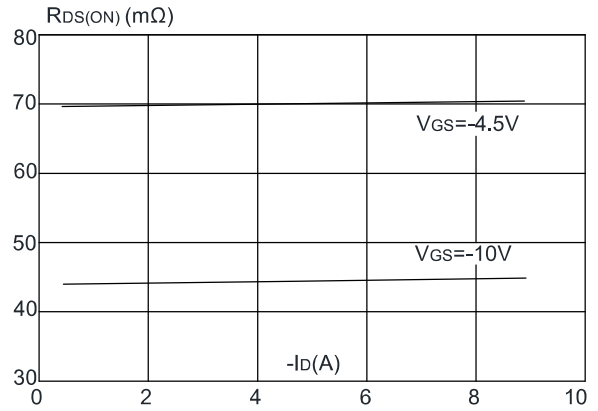


Figure 4: Body Diode Characteristics

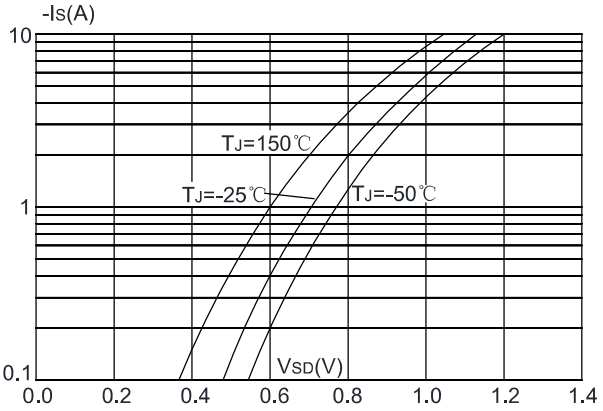


Figure 5: Gate Charge Characteristics

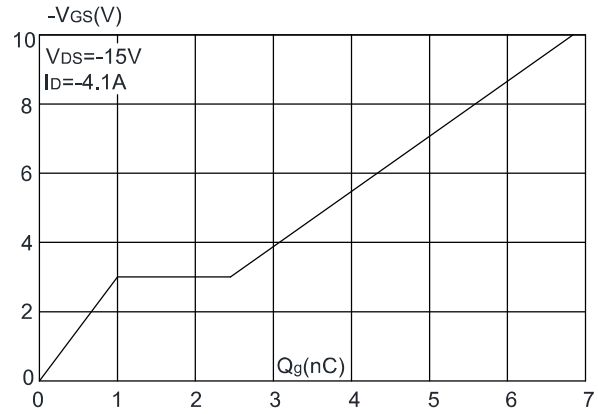


Figure 6: Capacitance Characteristics

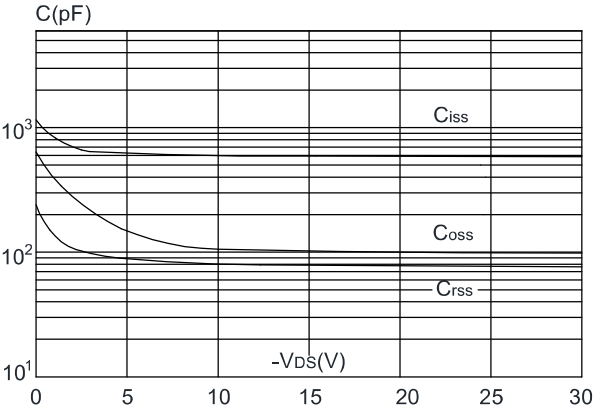


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

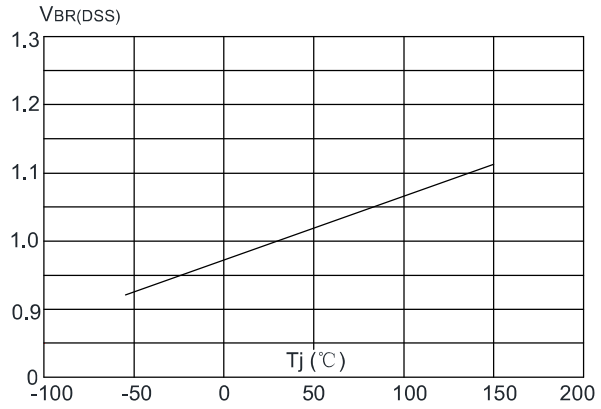


Figure 8: Normalized on Resistance vs. Junction Temperature

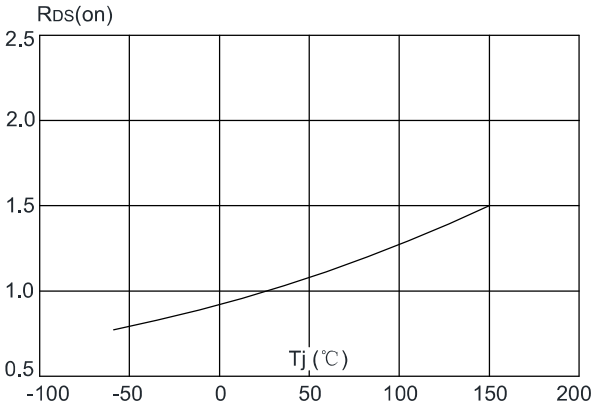


Figure 9: Maximum Safe Operating Area

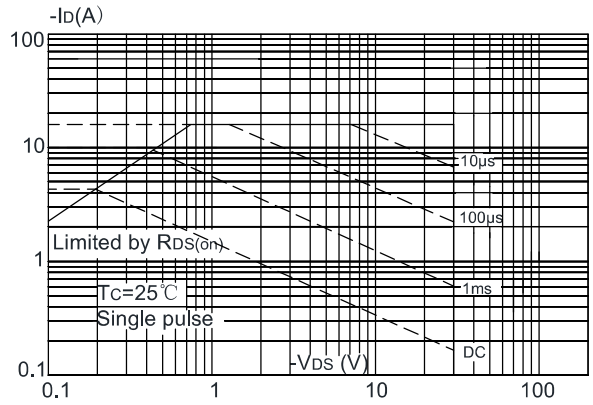


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

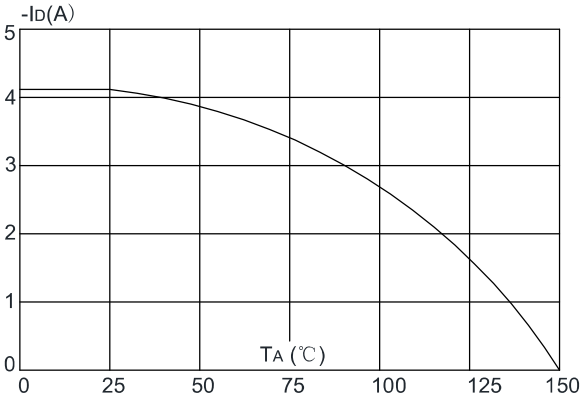
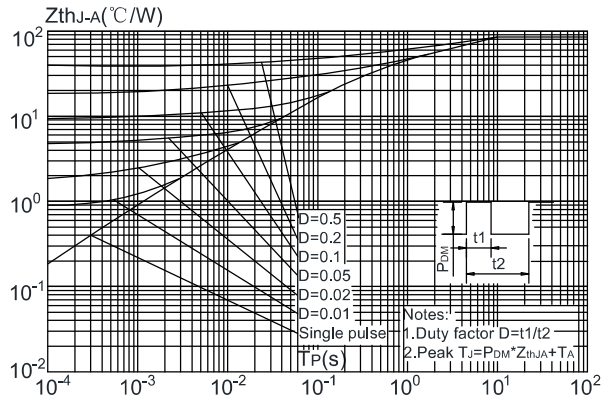
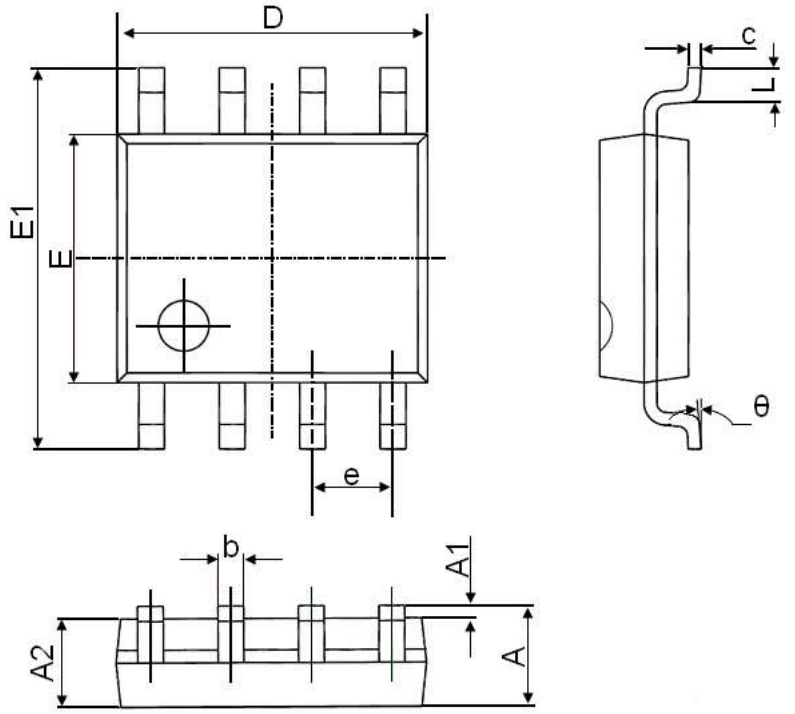


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°