
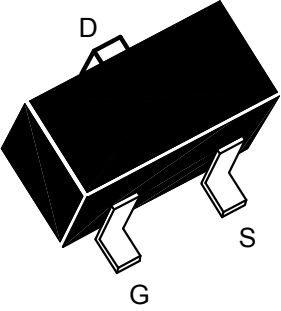
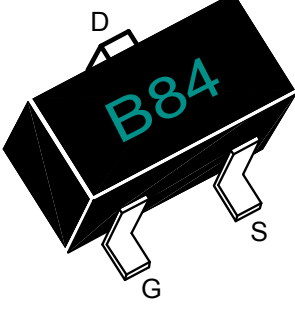
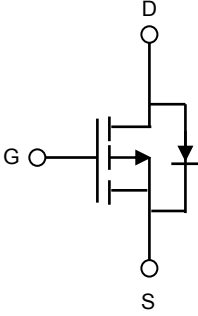




**P-channel Enhancement Mode Power MOSFET**

<p><b>Features</b></p> <ul style="list-style-type: none"> <li>◆ <math>V_{DS} = -50V</math>, <math>I_D = -0.13A</math></li> <li>◆ <math>R_{DS(ON)} &lt; 3.6m\Omega @ V_{GS} = -10V</math></li> <li>◆ <math>R_{DS(ON)} &lt; 5.4m\Omega @ V_{GS} = -4.5V</math></li> <li>◆ Advanced Trench Technology</li> <li>◆ Provide Excellent <math>R_{DS(ON)}</math> and Low Gate Charge</li> <li>◆ Lead free product is acquired</li> </ul>	<p><b>Application</b></p> <ul style="list-style-type: none"> <li>◆ Load Switch</li> <li>◆ PWM Application</li> <li>◆ Power Management</li> </ul> <p style="text-align: center;"><i>100% UIS TESTED!</i> <i>100% <math>\Delta V_{ds}</math> TESTED!</i></p> <div style="text-align: right;">  </div>
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Marking and pin Assignment	SOT-23 top view	Schematic Diagram
		

**Absolute Maximum Ratings (  $T_C = 25^\circ C$  unless otherwise specified )**

Symbol	Parameter	Max.	Unit	
$V_{DSS}$	Drain-Source Voltage	-50	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$		
$I_D$	Continuous Drain Current	$T_A = 25^\circ C$	-0.13	A
		$T_A = 100^\circ C$	-0.08	
$I_{DM}$	Pulsed Drain Current <sup>note1</sup>	-0.52		
$P_D$	Power Dissipation	$T_A = 25^\circ C$	0.225	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	556	$^\circ C/W$	
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55~+150	$^\circ C$	

Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)**Off Characteristic**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	-50	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-50V, V <sub>GS</sub> =0V	--	--	-1	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	--	--	±100	nA

**On Characteristics**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	--	-1.5	-2.5	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <sup>note3</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =-0.13A	--	2.2	3.6	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =0.1A	--	2.6	5.4	

**Dynamic Characteristics**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-25V V <sub>GS</sub> =0V f=1.0MHz	--	30	--	pF
C <sub>oss</sub>	Output Capacitance		--	10	--	
C <sub>riss</sub>	Reverse Transfer Capacitance		--	5	--	
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-25V I <sub>D</sub> =-0.13A V <sub>GS</sub> =10V	--	4.5	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	0.8	--	
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		--	1.2	--	

**Switching Characteristics**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =-2.5V I <sub>D</sub> =-0.1A R <sub>GEN</sub> =2.5Ω V <sub>GS</sub> =-10V	--	2.5	--	nS
t <sub>r</sub>	Turn-on Rise Time		--	1	--	
t <sub>d(off)</sub>	Turn-off Delay Time		--	16	--	
t <sub>f</sub>	Turn-off Fall Time		--	8	--	

**Drain-Source Diode Characteristics and Maximum Ratings**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current	V <sub>GS</sub> =0V, I <sub>S</sub> =-0.13A	--	--	-0.13	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		--	--	-0.52	
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-0.13A	--	-0.8	-1.2	V

**Notes:**

- 1、Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- 3、Pulse Test : Pulse Width ≤ 300μs , Duty Cycle ≤ 2%



Typical Performance Characteristics

FIG-1: Output Characteristics

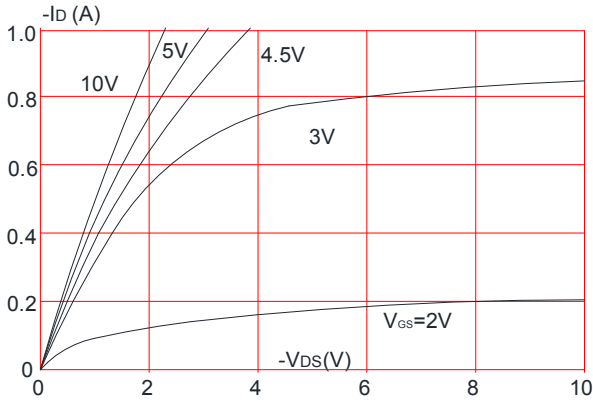


FIG-2: Typical Transfer Characteristics

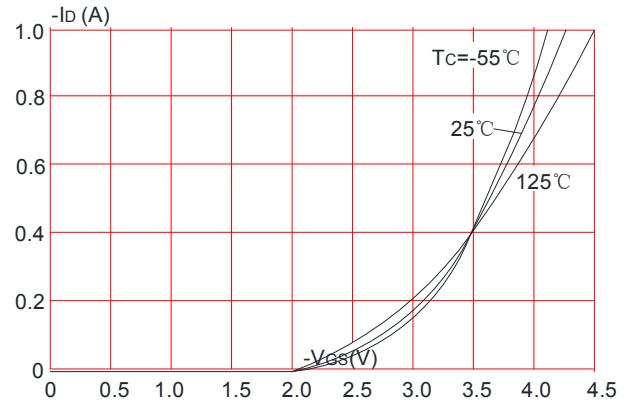


FIG-3: On-resistance vs. Drain Current

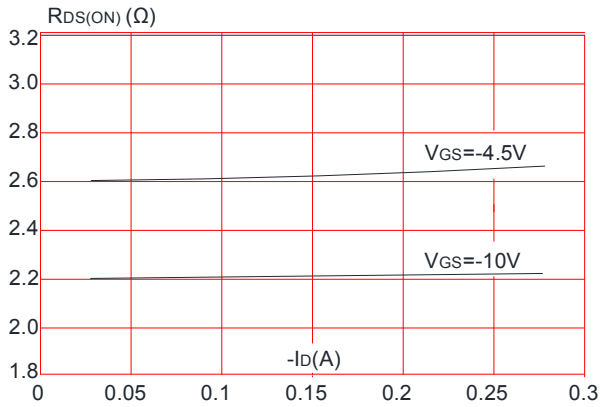


FIG-4: Body Diode Characteristics

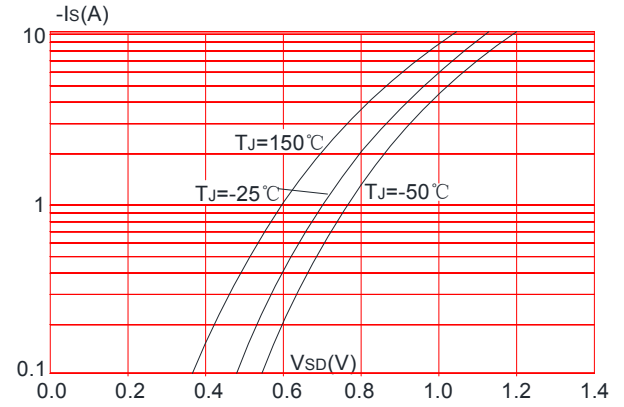


FIG-5: Gate Charge Characteristics

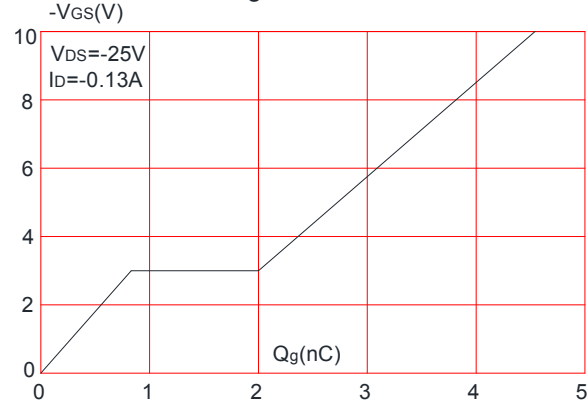


FIG-6: Capacitance Characteristics

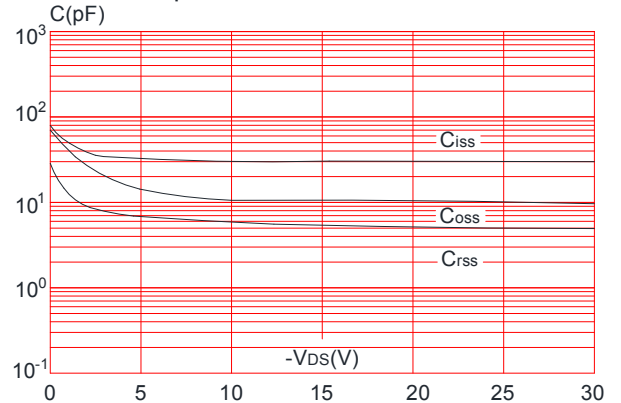




FIG-7: Normalized Breakdown Voltage vs. Junction Temperature

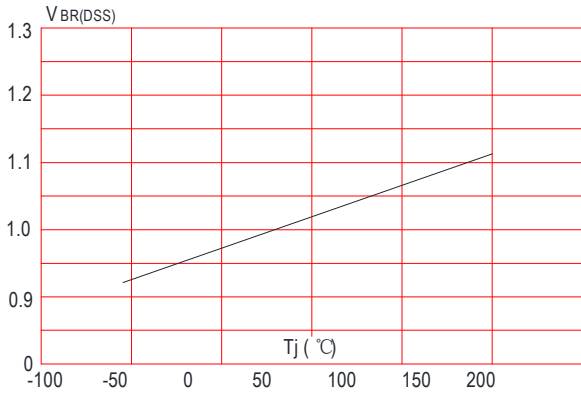


FIG-8: Normalized on Resistance vs. Junction Temperature

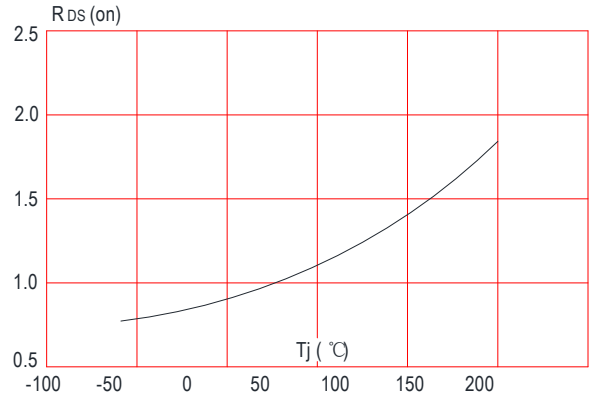


FIG-9: Maximum Safe Operating Area

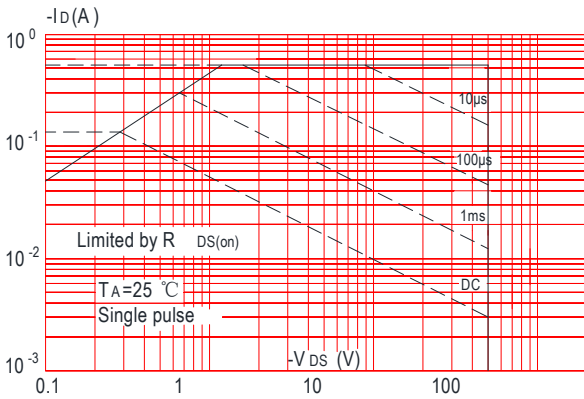


FIG-10: Maximum Continuous Drain Current vs. Ambient Temperature

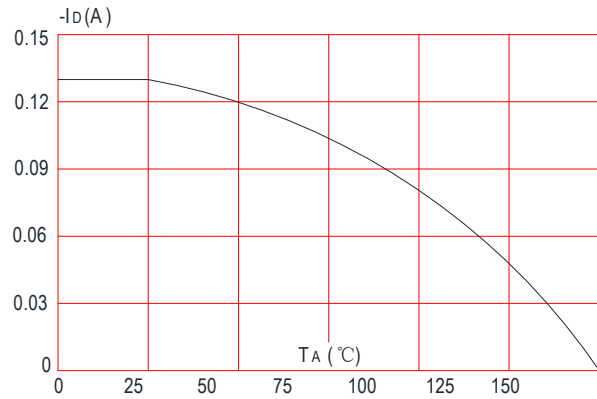
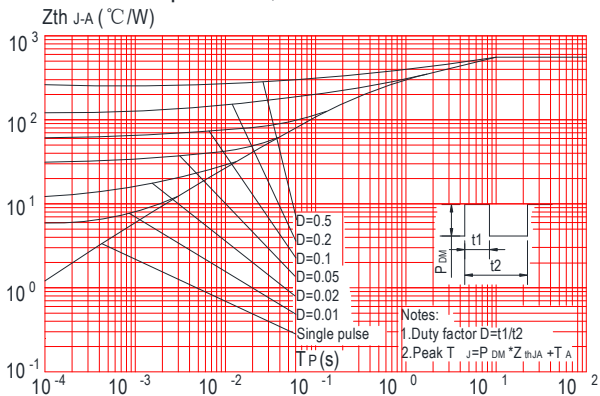


FIG-11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



TEST CIRCUITS AND WAVEFORMS

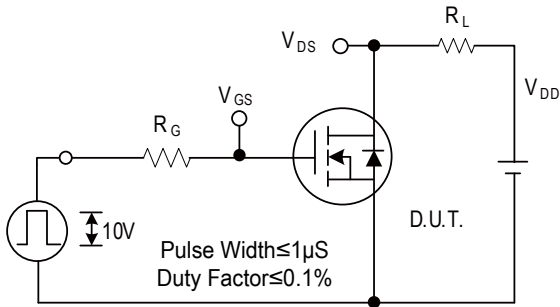


Fig-2A: Switching Test Circuit

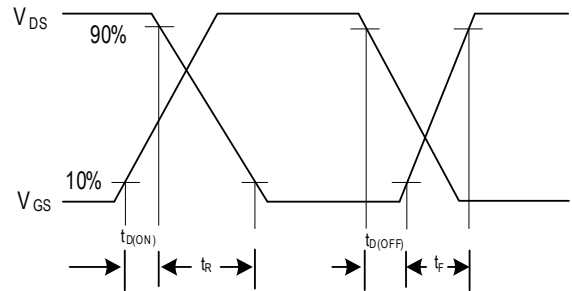


Fig-2B: Switching Waveforms

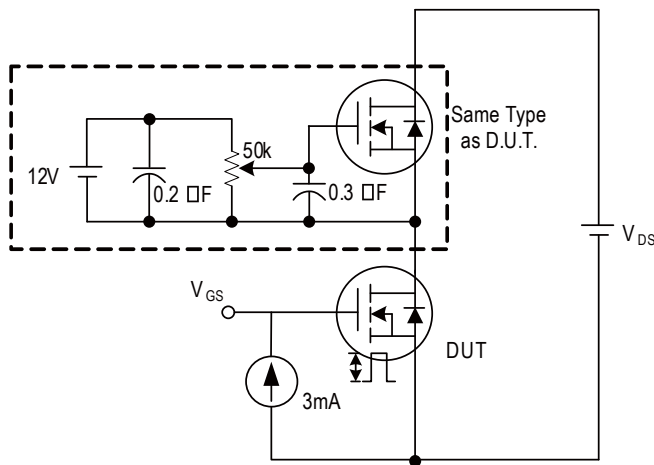


Fig-3A: Gate Charge Test Circuit

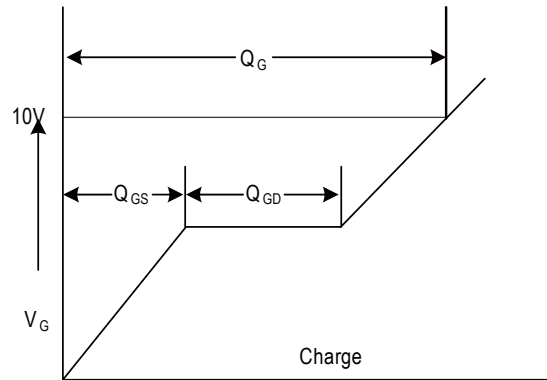


Fig-3B: Gate Charge Waveform

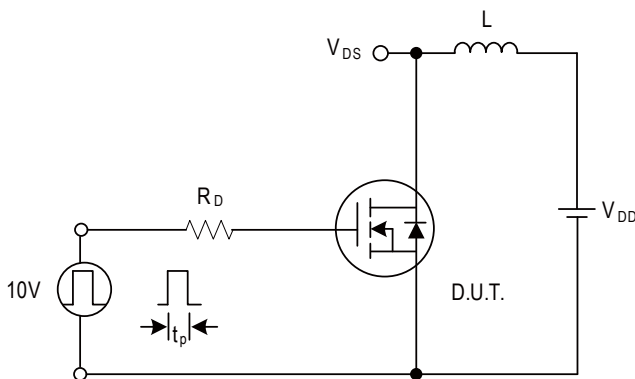


Fig-4A: Unclamped Inductive Switching Test Circuit

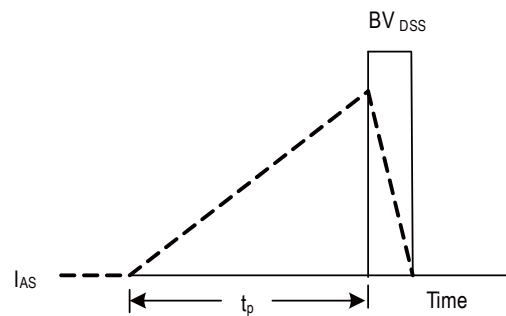


Fig-4B: Unclamped Inductive Switching Waveforms



SOT-23 PACKAGE MECHANICAL DATA

	Dimensions				
	Ret.	Millimeters		Inches	
		Min.	Max.	Min.	Max.
	A	2.30	2.50	0.091	0.098
	B	2.80	3.00	0.110	0.118
C	1.90 REF		0.075 REF		
D	0.35	0.45	0.014	0.018	
E	1.20	1.40	0.047	0.055	
F	0.90	1.10	0.035	0.043	
G		0.15		0.008	
H	0.20		0.008		
I	0	0.10	0	0.004	

Package Information-SOT-23

	Dimensions		
	Ret.	Millimeters	Inches
	A0	3.15 ±0.3	0.124 ±0.012
	B0	2.77 ±0.3	0.109 ±0.012
	C	178	7
	D0	1.50 ±0.1	0.059 ±0.004
	E	1.75 ±0.2	0.069 ±0.008
	E1	13.3 ±0.3	0.524 ±0.012
	F	3.50 ±0.2	0.138 ±0.008
	P0	4.00 ±0.2	0.157 ±0.008
	P1	4.00 ±0.2	0.157 ±0.008
	P2	2.00 ±0.2	0.079 ±0.008
	W	8.00 ±0.2	0.315 ±0.008
	W1	11.5 ±1.0	0.453 ±0.039

SOT-23 PACKAGE INFORMATION

Device model	Marking	OUTLINE	Device Package	Reel Size	Reel (Pcs)	Per Carton (Pcs)
HPMB84A	B84	TAPING	SOT-23	7 Inch	3000 (3K)	180000 (180K)



Manufacturers version information  
2020-03-10 . HAOHAI™ Product Data-1.0  
2021-09-17 . HAOHAI™ Product Data-1.1



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