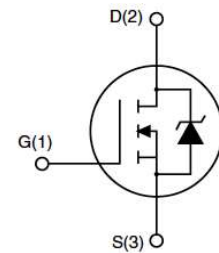


Features

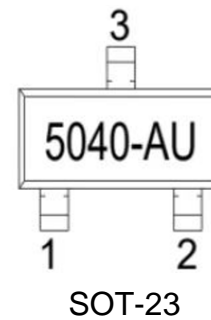
- 40V,5A
 $R_{DS(ON)} < 40m\Omega @ V_{GS}=10V$ TYP:30m Ω
 $R_{DS(ON)} < 60m\Omega @ V_{GS}=4.5V$ TYP:40m Ω
- Lead free and Green Device Available
- Excellent RDS(ON) and Low Gate Charge
- Lead free product Fast switching speed
- Tjmax=175°C
- AEC-Q101 qualified

Applications

- Load Switch
- PWM Application
- Power management



Schematic diagram



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
5040-AU	AP5040-AU	SOT-23	-	-	3000

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	40	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current (T _a =25°C)	I _D	5	A
Continuous Drain Current (T _a =100°C)	I _D	3	A
Pulsed Drain Current ⁽¹⁾	I _{DM}	20	A
Power Dissipation (T _a =25°C)	P _D	1.9	W
Single Pulsed Avalanche Energy ⁽³⁾	E _{AS}	1.8	mJ
Thermal Resistance- Junction to Foot	R _{θJF}	40	°C/W
Thermal Resistance- Junction to Ambient	R _{θJA}	78	°C/W
Junction Temperature	T _J	175	°C
Storage Temperature	T _{STG}	-55~ +175	°C

MOSFET ELECTRICAL CHARACTERISTICS(T_J=25°C 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	40	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =40V, V _{GS} = 0V, T _J =25°C	-	-	1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.2	V
Drain-source on-resistance ⁽²⁾	R _{DS(on)}	V _{GS} =10V, I _D =4A	-	30	40	mΩ
		V _{GS} =4.5V, I _D =3A		40	60	
Dynamic characteristics						
Input Capacitance	C _{iSS}	V _{DS} =20V, V _{GS} =0V, f =1.0MHz	-	435	-	pF
Output Capacitance	C _{oss}		-	58	-	
Reverse Transfer Capacitance	C _{rSS}		-	35	-	
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} =20V, I _D =4A, R _L =1Ω, R _G =3Ω V _{GS} =10V	-	10	-	ns
Turn-on rise time	t _r		-	8	-	
Turn-off delay time	t _{d(off)}		-	29	-	
Turn-off fall time	t _f		-	12	-	
Total Gate Charge	Q _g	V _{DS} =20V, I _D =3A, V _{GS} =10V	-	11	-	nC
Gate-Source Charge	Q _{gs}		-	2	-	
Gate-Drain Charge	Q _{gd}		-	2.5	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V _{SD}	T _J =25°C, V _{GS} =0V, I _S =5A	-	-	1.2	V
Diode Forward current	I _S	T _a =25°C	-	-	5	A
Body Diode Reverse Recovery Time	t _{rr}	T _J =25°C, I _F =5A, di/dt=100A/us		20		ns
Body Diode Reverse Recovery Charge	Q _{rr}	T _J =25°C, I _F =5A, di/dt=100A/us		11		uc

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

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

3. EAS condition: T_J=25°C, V_{DD}=15V, V_G=10V, I_{AS}=6A, R_G=25Ω, L=0.1mH

Test Circuit

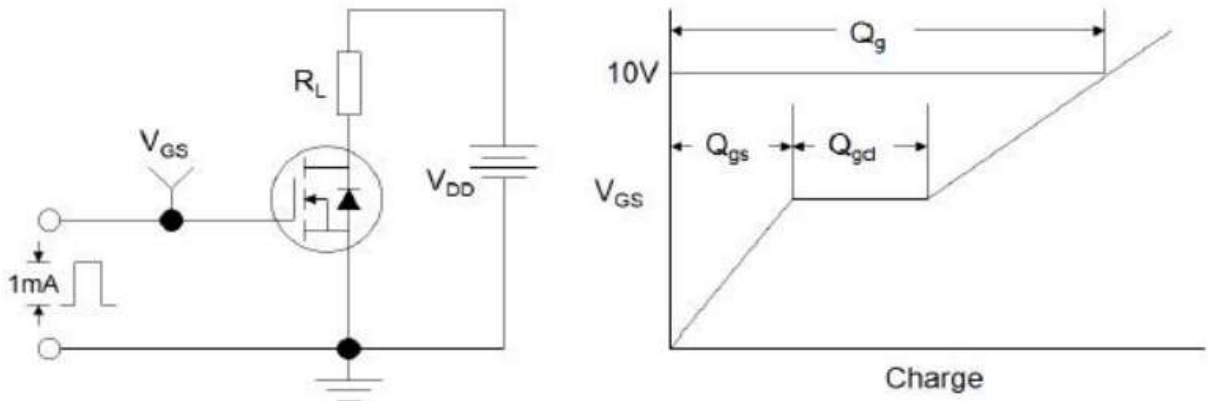


Figure1:Gate Charge Test Circuit & Waveform

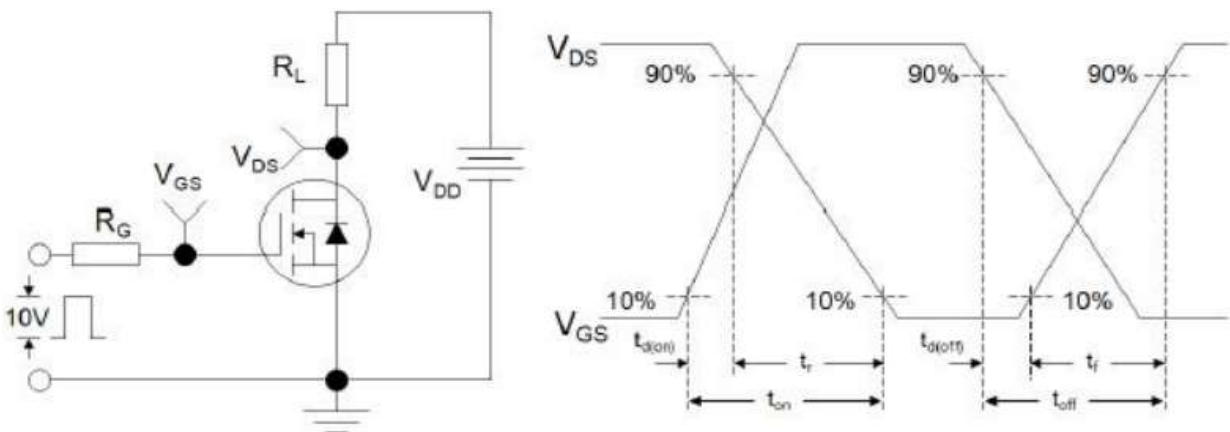


Figure 2: Resistive Switching Test Circuit & Waveforms

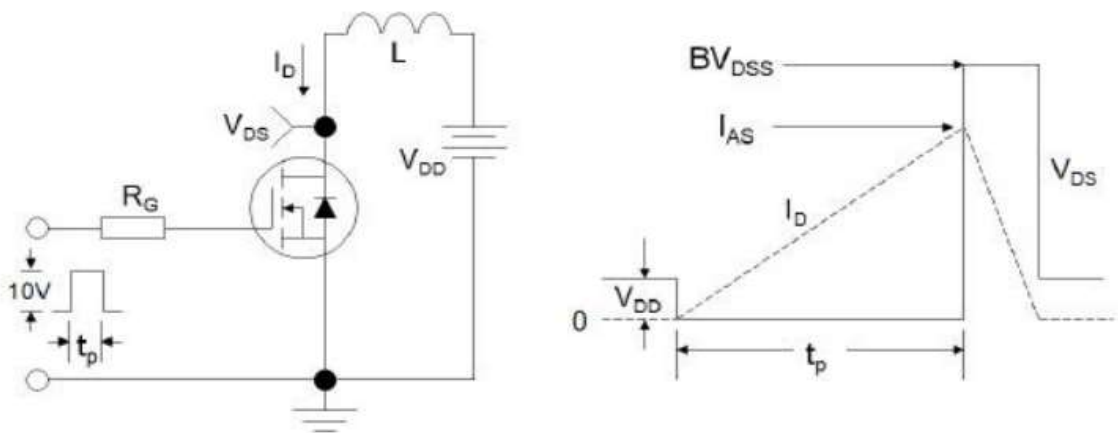


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Typical Performance Characteristics

Figure 1: Output Characteristics

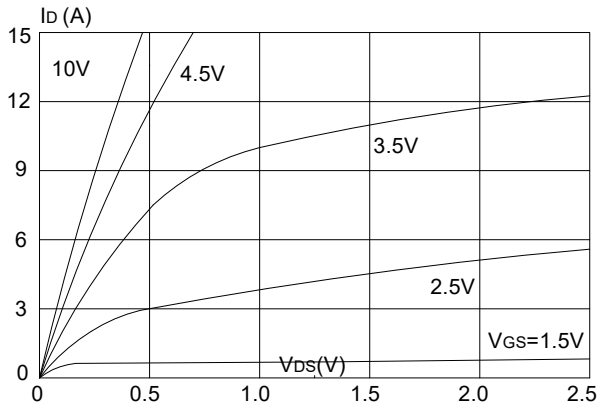


Figure 2: Typical Transfer Characteristics

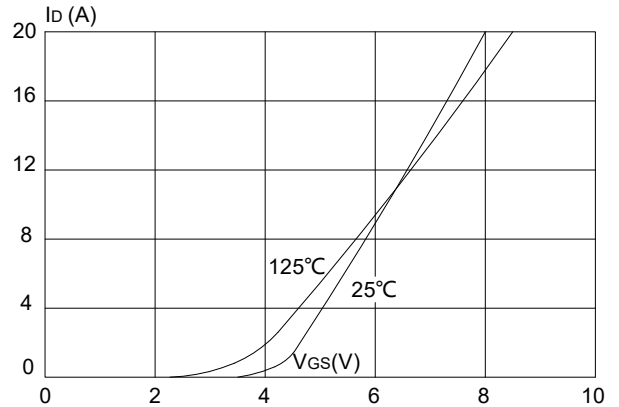


Figure 3: On-resistance vs. Drain Current

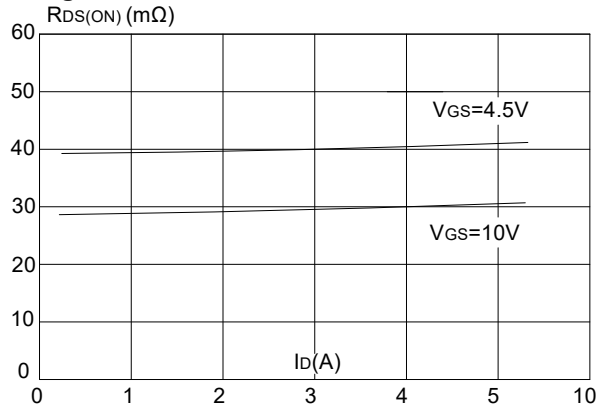


Figure 4: Body Diode Characteristics

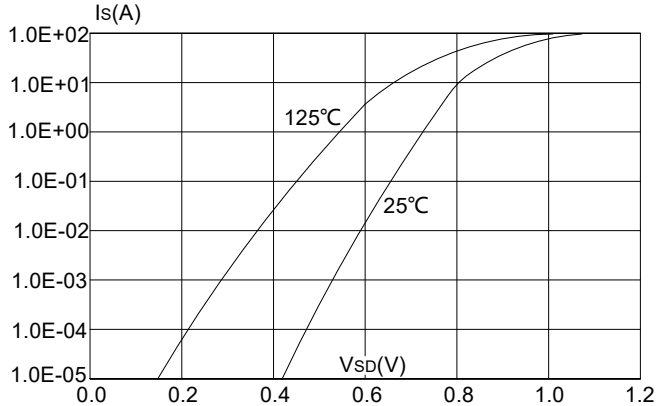


Figure 5: Gate Charge Characteristics

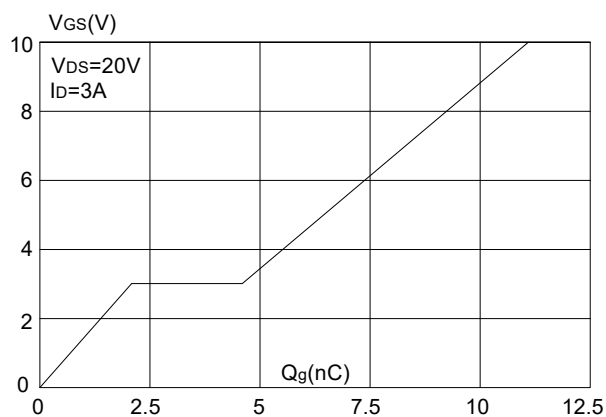


Figure 6: Capacitance Characteristics

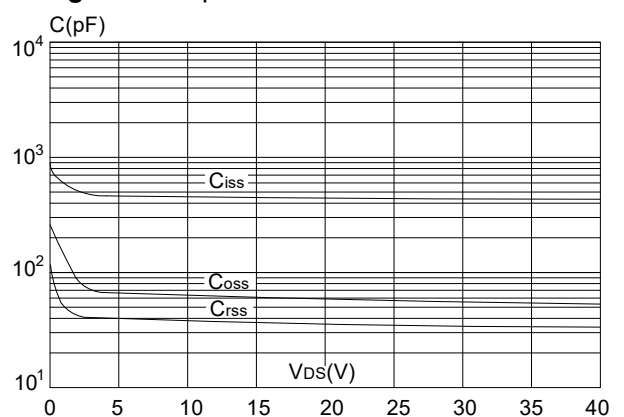


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

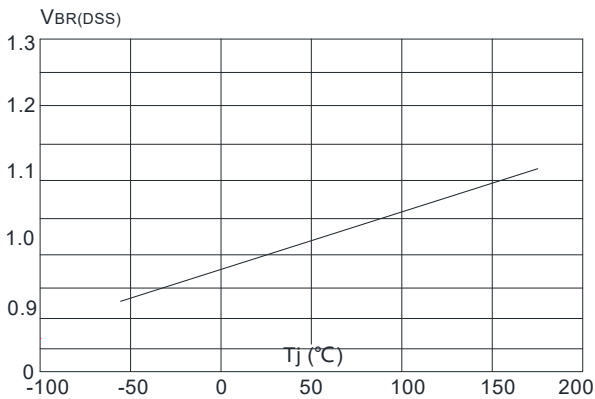


Figure 8: Normalized on Resistance vs. Junction Temperature

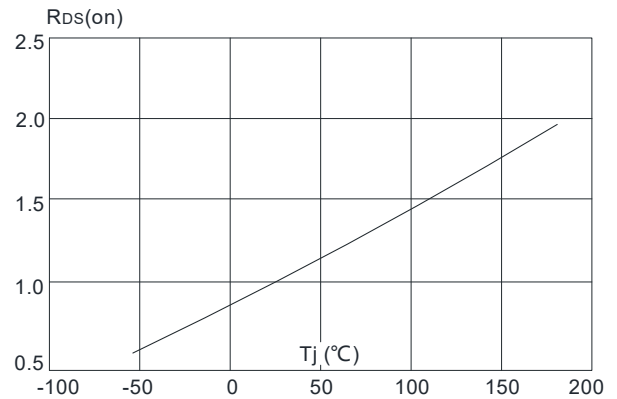


Figure 9: Maximum Safe Operating Area

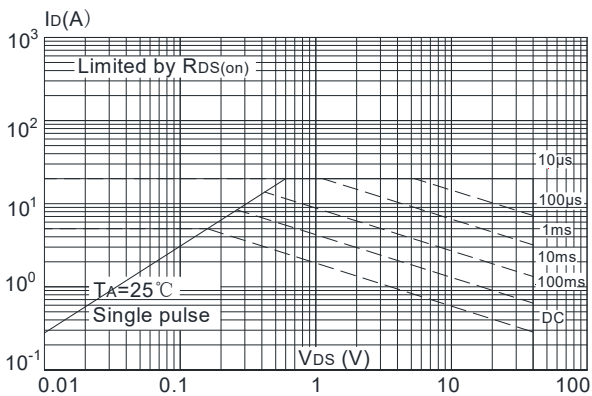


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

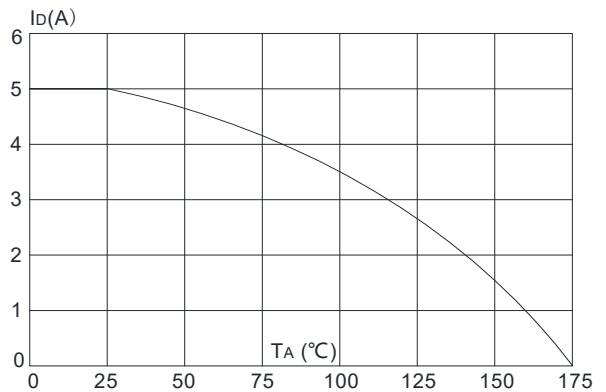
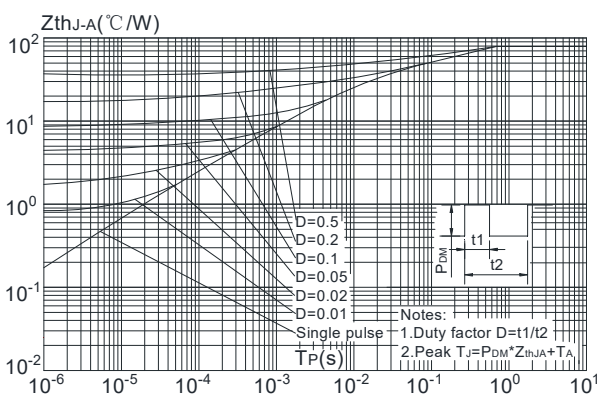
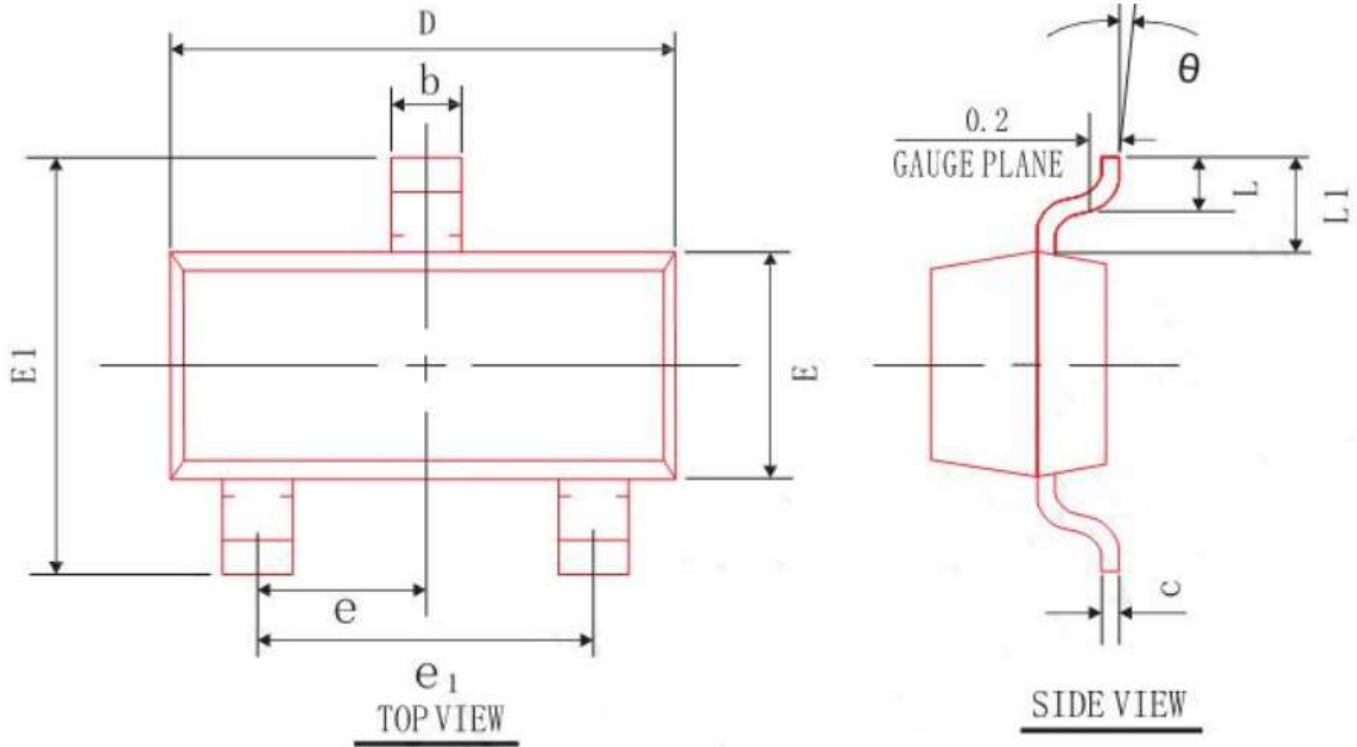


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Package Mechanical Data- SOT-23



SYMBOL	MIN	NOM	MAX
A	0.90	1.05	1.20
A1	0.00	0.05	0.10
A2	0.90	1.00	1.10
b	0.30	0.40	0.50
c	0.08	0.10	0.15
D	2.80	2.90	3.00
E	1.20	1.30	1.40
E1	2.30	2.40	2.50
L	0.30	0.40	0.50
θ	0°	5°	10°
L1	0.55 REF		
e	0.95 BSC		
e ₁	1.90 REF		

Revision History

Revision	Release	Remark
V1.0	2023/06/06	Initial Release
V1.1	2023/11/29	Add Test

Disclaimer

The information given in this document describes the independent performance of the product, but similar performance is not guaranteed under other working conditions, and cannot be guaranteed when installed with other products or equipment. To achieve the required performance of the product in actual scenarios, the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings, operating conditions, or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability. Customers using or selling these products for use in medical, life-saving, or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.