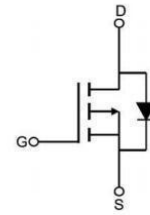


Features

- -30V,-10A
 $R_{DS(on)} < 21m\ \Omega @ V_{GS} = -10V$ TYP:15m Ω
 $R_{DS(on)} < 30m\ \Omega @ V_{GS} = -4.5V$ TYP:22m Ω
- Advanced Trench Technology
- Fast Switching
- Exceptional on-resistance and maximum DC current capability



Schematic Diagram



Marking and pin assignment

Applications

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
50P03K	AP50P03K	TO-252	-	-	2500

ABSOLUTE MAXIMUM RATINGS ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_c=25^\circ\text{C}$) ⁽¹⁾	I_D	-10	A
Continuous Drain Current ($T_c=100^\circ\text{C}$) ⁽¹⁾	I_D	-7	A
Pulsed Drain Current ^(2,3)	I_{DM}	-40	A
Drain Power Dissipation ⁽¹⁾	P_D	30	W
Single Pulsed Avalanche Energy	E_{AS}	36	mJ
Thermal Resistance from Junction to Case	$R_{\theta JC}$	4.2	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	56	$^\circ\text{C/W}$
Junction Temperature	T_J	-55~ +150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

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	-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 ⁽⁴⁾	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-1.5	-2.5	V
Drain-source on-resistance ⁽⁴⁾	R _{DS(on)}	V _{GS} = -10V, I _D = -15A	-	15	21	mΩ
		V _{GS} = -4.5V, I _D = -10A	-	22	30	mΩ
Dynamic characteristics⁽⁵⁾						
Input Capacitance	C _{iSS}	V _{DS} = -15V, V _{GS} = 0V, f = 1MHz	-	1550	-	pF
Output Capacitance	C _{oSS}		-	327	-	
Reverse Transfer Capacitance	C _{rSS}		-	278	-	
Switching characteristics⁽⁵⁾						
Turn-on delay time	t _{d(on)}	V _{DD} = -15V, I _D = -6A, R _G = 2.5Ω, V _{GS} = -10V	-	14	-	nS
Turn-on rise time	t _r		-	20	-	
Turn-off delay time	t _{d(off)}		-	95	-	
Turn-off fall time	t _f		-	65	-	
Total Gate Charge	Q _g	V _{DS} = -15V, I _D = -10A, V _{GS} = -10V	-	30	-	nC
Gate-Source Charge	Q _{gs}		-	5.3	-	
Gate-Drain Charge	Q _{gd}		-	7.6	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽⁴⁾	V _{SD}	T _J = 25°C, V _{GS} = 0V, I _S = -10A	-	-	-1.2	V
Diode Forward current	I _S	T _C = 25°C	-	-	-10	A

Notes:

- 1) Surface Mounted on 1 in² pad area, t ≤ 10 sec
- 2) Pulse width ≤ 10μs, duty cycle ≤ 1 %
- 3) Limited by bonding wire
- 4) Pulse width ≤ 300 μs, duty cycle ≤ 2%
- 5) Guaranteed by design, not subject to production testing

Typical Characteristics

Figure 1: Output Characteristics

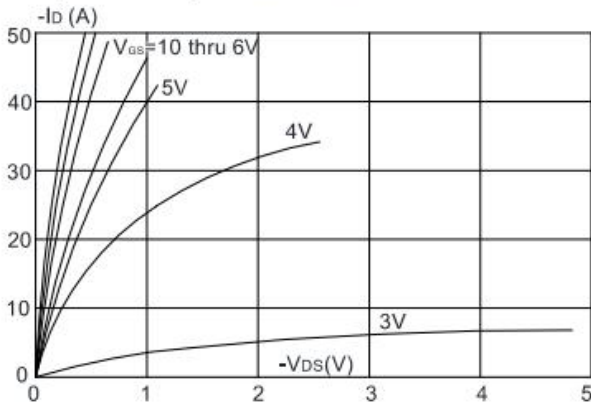


Figure 2: Typical Transfer Characteristics

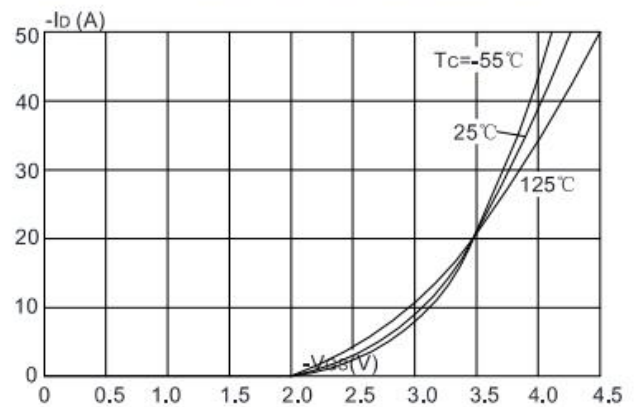


Figure 3: On-resistance vs. Drain Current

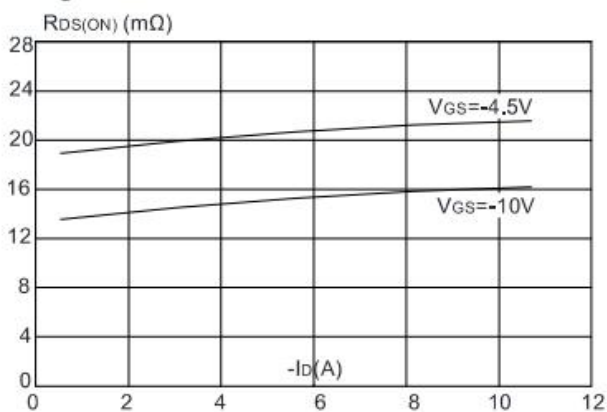


Figure 4: Body Diode Characteristics

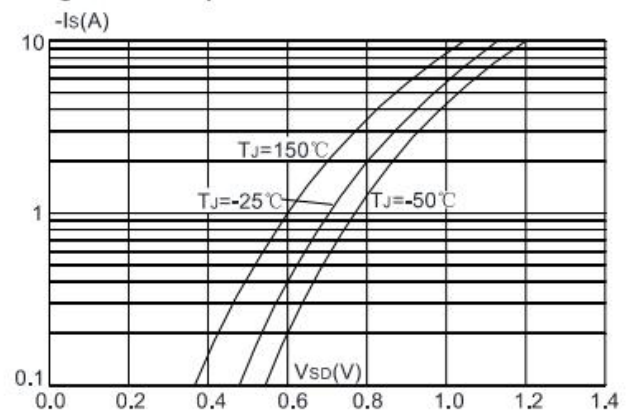


Figure 5: Gate Charge Characteristics

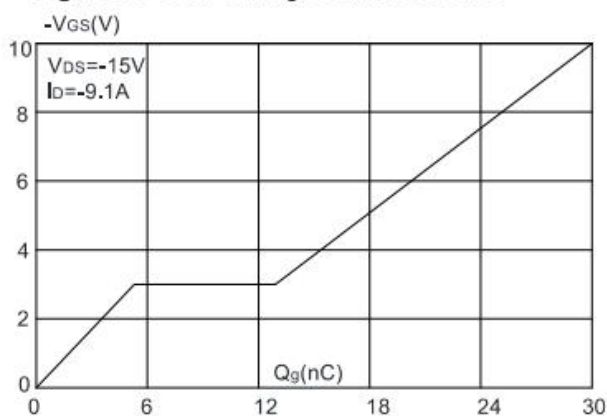
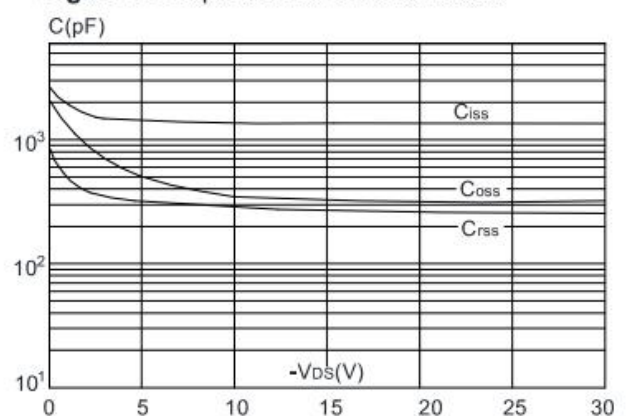


Figure 6: Capacitance Characteristics



Typical Characteristics (cont.)

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

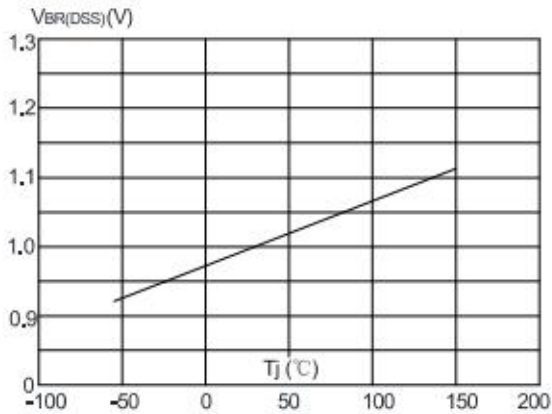


Figure 8: Normalized on Resistance vs. Junction Temperature

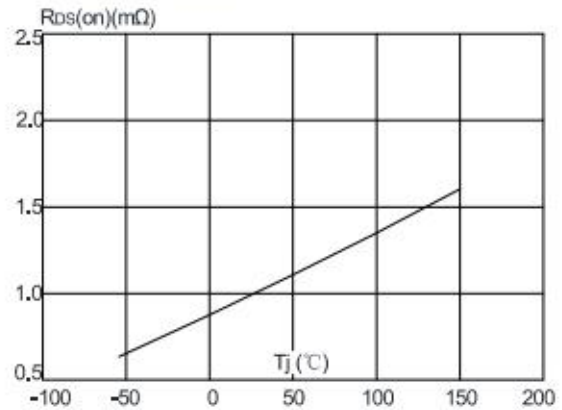


Figure 9: Maximum Safe Operating Area

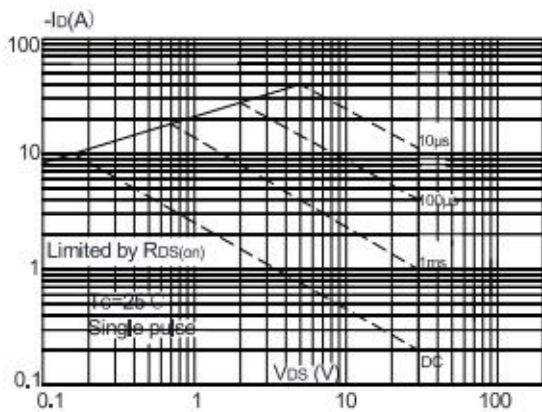


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

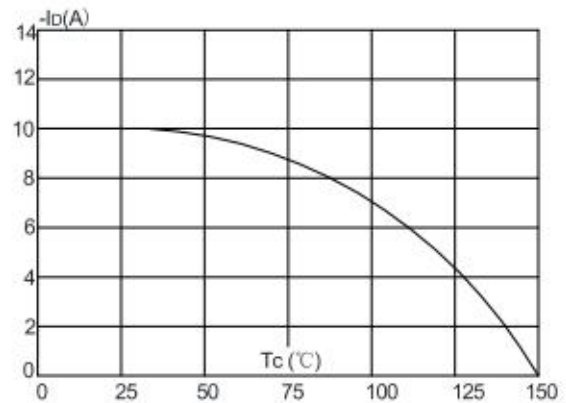
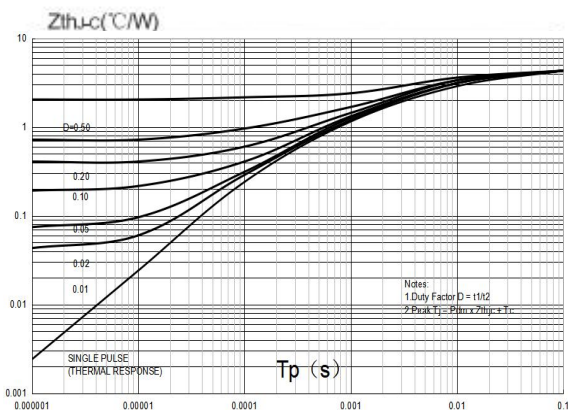
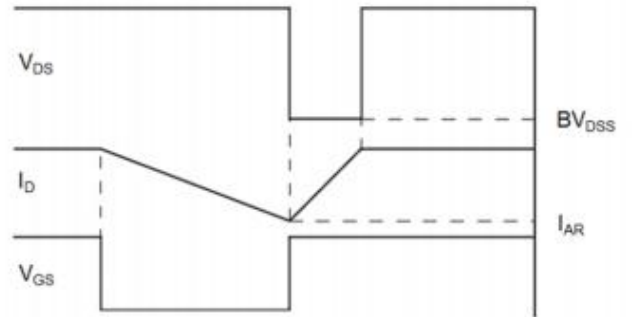
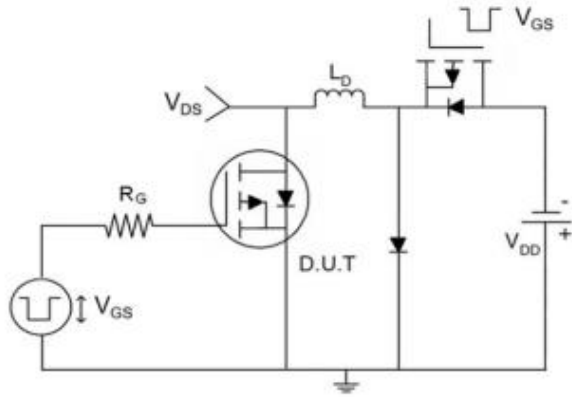


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

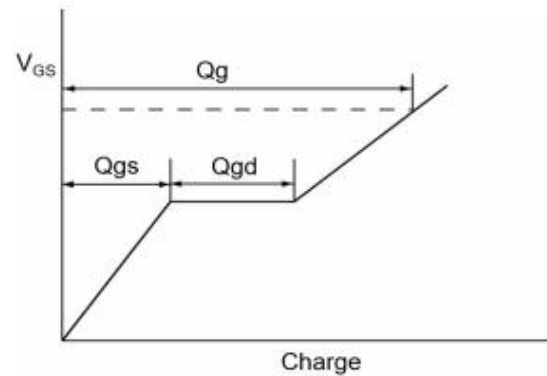
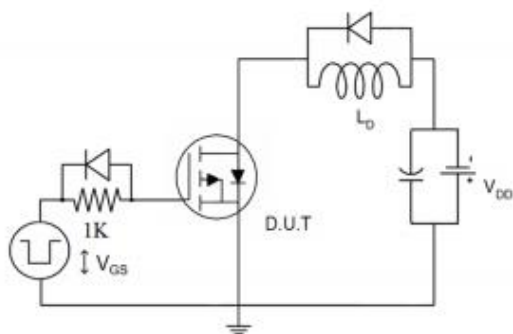


Test Circuit

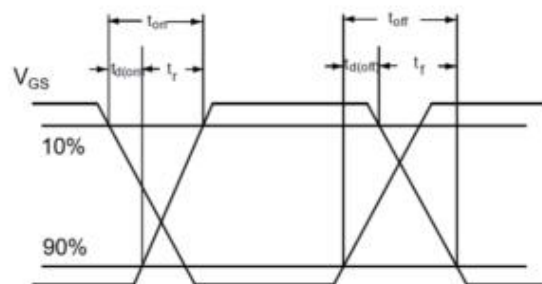
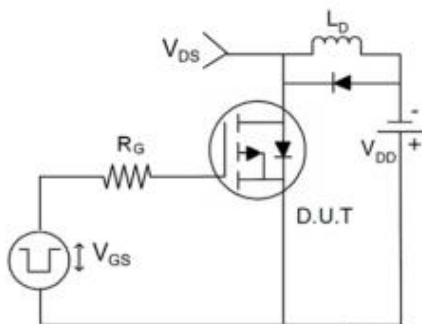
1) E_{AS} Test Circuits



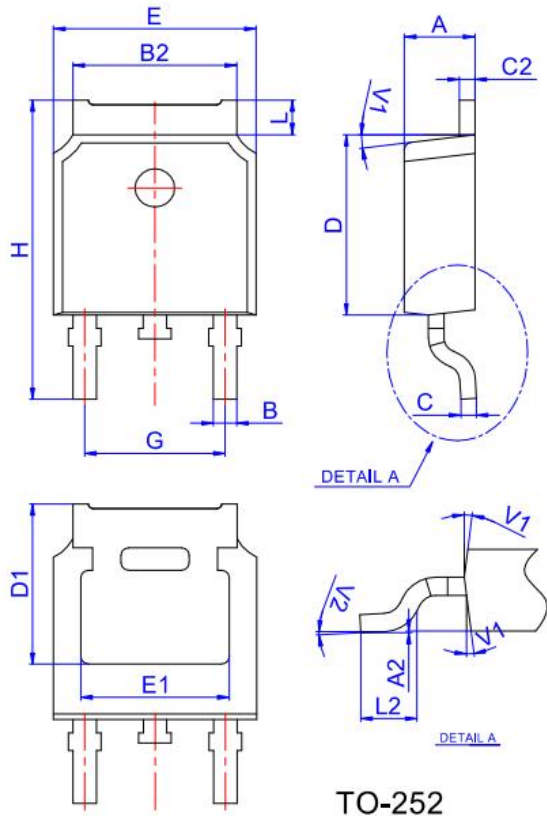
2) Gate Charge Test Circuit



3) Switch Time Test Circuit



TO-252 Package Information



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Revision History

Revision	Release	Remark
V1.0	2023/04/01	Initial Release

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.