



**DESCRIPTION**

The AM50P04 is available in TO-252 Package

BVDSS	RDSON	ID
-40V	10mΩ	-50A

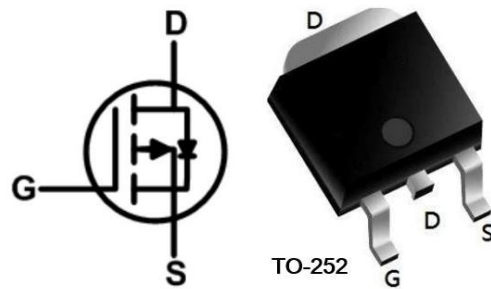
**FEATURE**

- Advanced high cell density Trench Technology
- $R_{DS(ON)typ.}=10m\Omega @ V_{GS}=10V$
- Excellent dv/dt effect decline
- Super Low Gate Charge

**ORDERING INFORMATION**

Package Type	Part Number	
TO-252 SPQ: 2,500pcs/Reel	D	AM50P04DR
		AM50P04DVR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

**PIN DESCRIPTION**



Pin#	Symbol	Function
1	G	Gate
2	D	Drain
3	S	Source

**ABSOLUTE MAXIMUM RATINGS**

T<sub>A</sub> = 25°C, unless otherwise specified.

Parameter	Symbol	Value	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	-40	V	
Gate-Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> = 25°C	-50	A
		T <sub>C</sub> = 100°C	-31	
Pulsed Drain Current <sup>(1)</sup>	I <sub>DM</sub>	-200	A	
Single Pulsed Avalanche Energy <sup>(2)</sup>	E <sub>AS</sub>	80	mJ	
Total Power Dissipation	P <sub>D</sub>	55	W	
Junction Temperature	T <sub>J</sub>	150	°C	
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C	
<b>THERMAL RESISTANCE</b>				
Thermal Resistance Junction-ambient <sup>(3)</sup>	R <sub>θJA</sub>	61	°C/W	
Thermal Resistance Junction-Case	R <sub>θJC</sub>	2.27	°C/W	

(1) Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.

(2) The EAS data shows Max. rating. The test condition is V<sub>DD</sub>= -25V, V<sub>GS</sub>= -10V, L=0.1mH, I<sub>AS</sub>= -40A.

(3) The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



**ELECTRICAL CHARACTERISTICS**

T<sub>A</sub> = 25°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-40	-	-	V
Zero Gate Voltage	I <sub>DSS</sub>	V <sub>DS</sub> = -40V, V <sub>GS</sub> = 0V	-	-	±100	nA
Drain Current			T <sub>A</sub> =100°C	-	-	1
Gate-body Leakage current	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	-	-	5	
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.0	-1.6	-2.5	V
Drain-Source On-Resistance <sup>4</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -16A	-	10.5	13	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -12A	-	14.2	20	
Forward Transconductance <sup>4</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -16A	-	44	-	S
<b>DYNAMIC CHARACTERISTICS<sup>5</sup></b>						
Input Capacitance	C <sub>iSS</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V, f = 1MHz	-	3050	-	pF
Output Capacitance	C <sub>oSS</sub>		-	282	-	
Reverse Transfer Capacitance	C <sub>rSS</sub>		-	230	-	
Gate Resistance	R <sub>g</sub>	f = 1MHz	-	9	-	Ω
<b>SWITCHING CHARACTERISTICS<sup>5</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> = -10V, V <sub>DS</sub> = 20V, I <sub>D</sub> = -16A	-	28	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	8	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	8.5	-	
Turn-on Delay Time	t <sub>d(ON)</sub>	V <sub>DD</sub> = -15V, I <sub>D</sub> = -16A, R <sub>G</sub> = 3Ω V <sub>GS</sub> = -10V	-	38	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	31	-	
Turn-Off Delay Time	t <sub>d(OFF)</sub>		-	90	-	
Turn-Off Fall Time	t <sub>f</sub>		-	9.2	-	
Diode Forward Voltage <sup>4</sup>	V <sub>SD</sub>	I <sub>S</sub> = -1A, V <sub>GS</sub> = 0V	-	-	-1.2	V
Continuous Source Current	I <sub>S</sub>	T <sub>C</sub> = 25°C	-	-	-50	A

(4) The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.

(5) This value is guaranteed by design hence it is not included in the production test.



## TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Output Characteristics

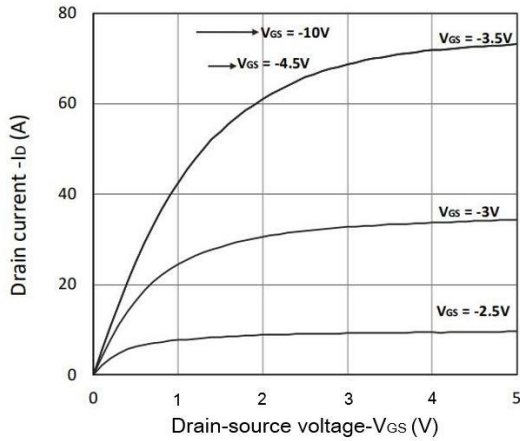


Fig 2. Transfer Characteristics

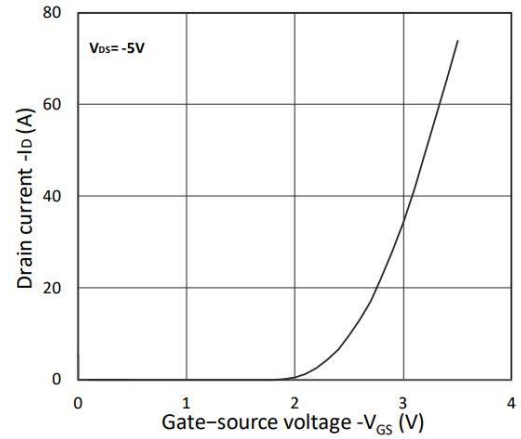


Fig 3. Forward Characteristics of Reverse

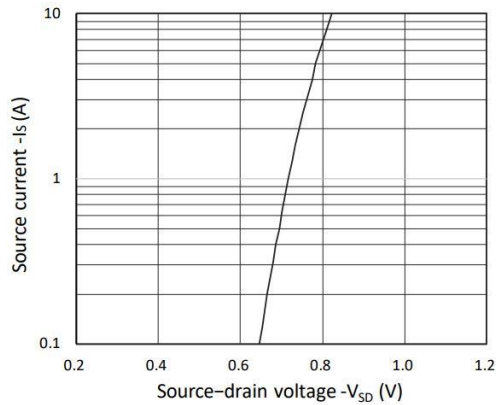


Fig 4.  $R_{DS(ON)}$  vs.  $V_{GS}$

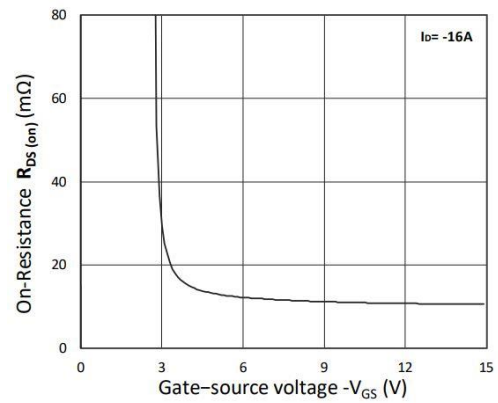


Fig 5.  $R_{DS(ON)}$  vs.  $I_D$

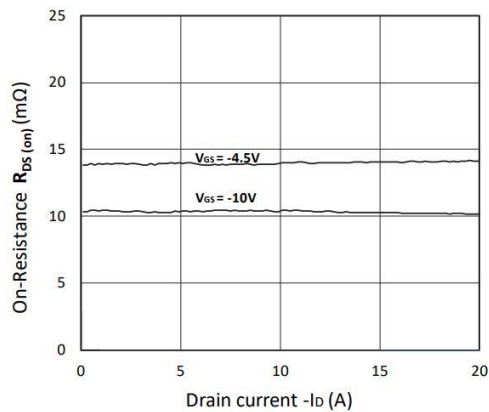


Fig 6. Normalized  $R_{DS(on)}$  vs. Temperature

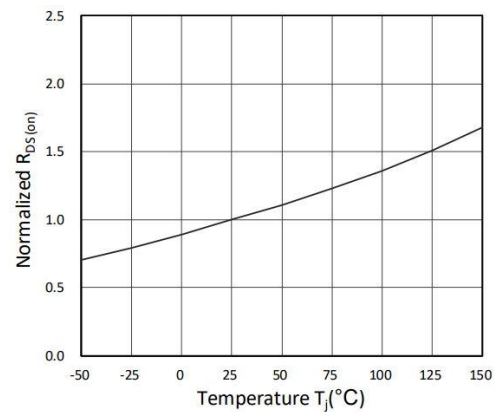




Fig 7. Capacitance Characteristics

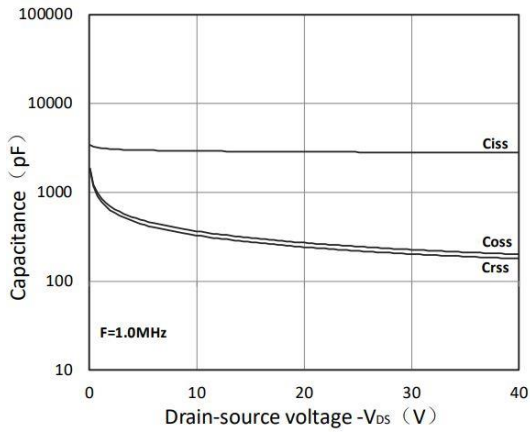


Fig 8. Gate Charge Characteristics

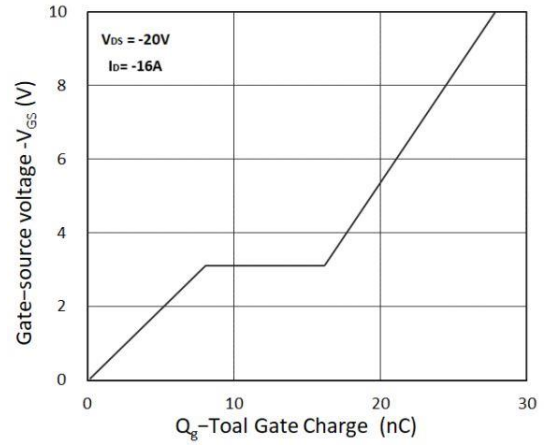


Fig 9. Power Dissipation

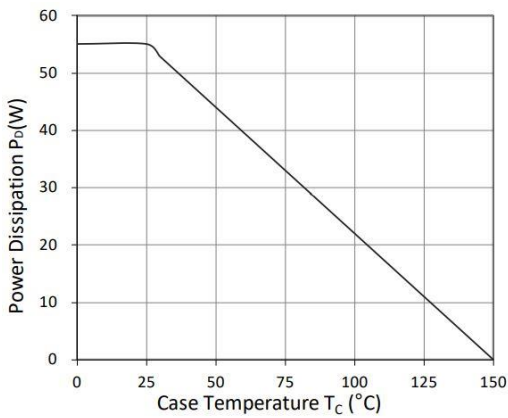


Fig 10. Safe Operating Area

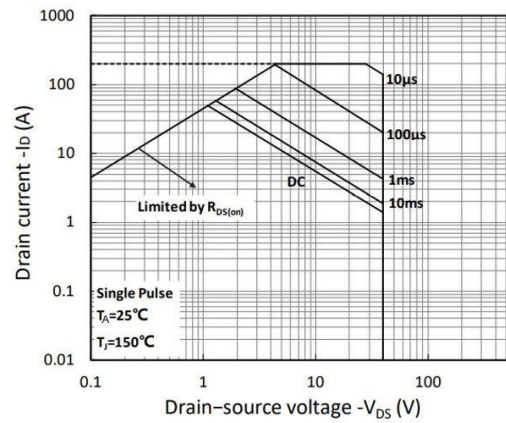


Fig 11. Normalized Maximum Transient Thermal Impedance

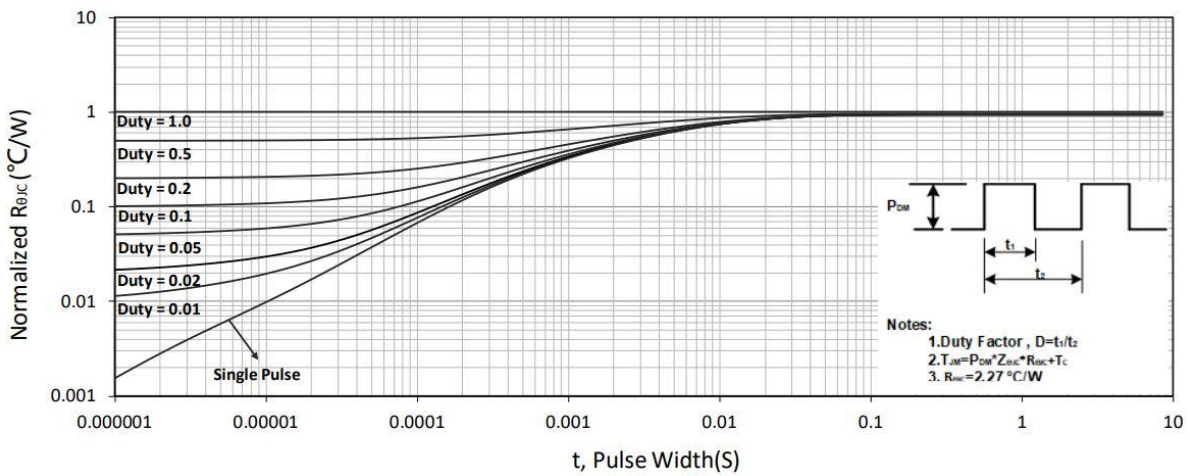




Fig 12. Gate Charge Test Circuit & Waveforms

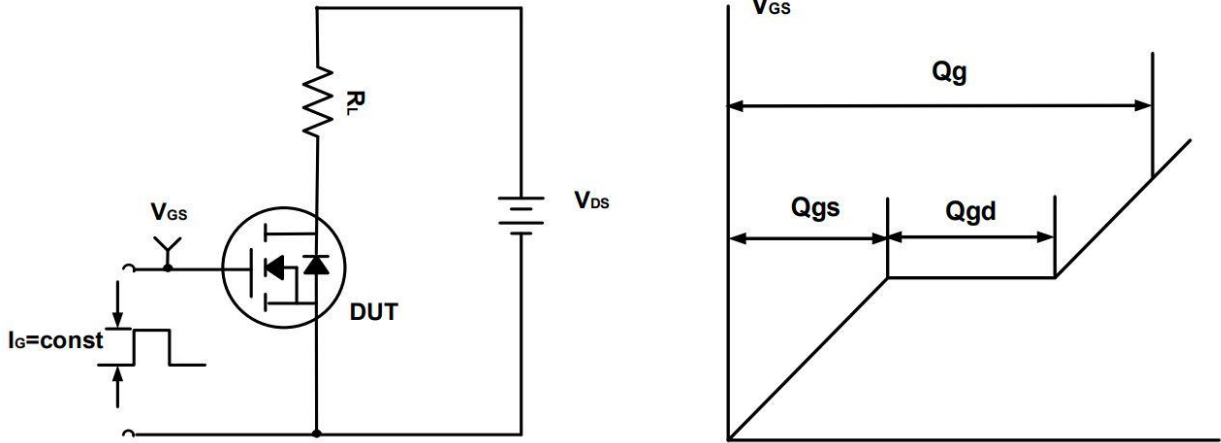


Fig 13. Switching Test Circuit & Waveforms

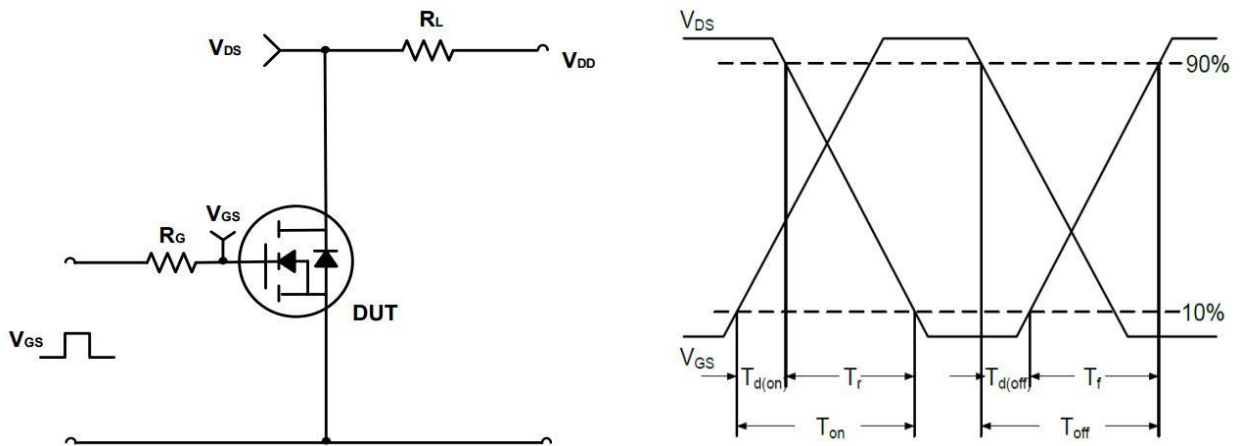
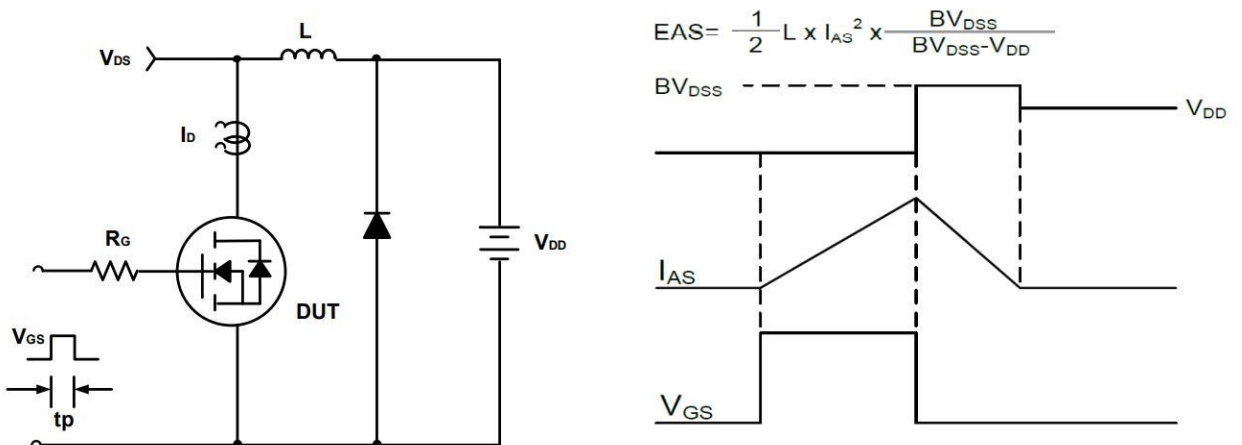


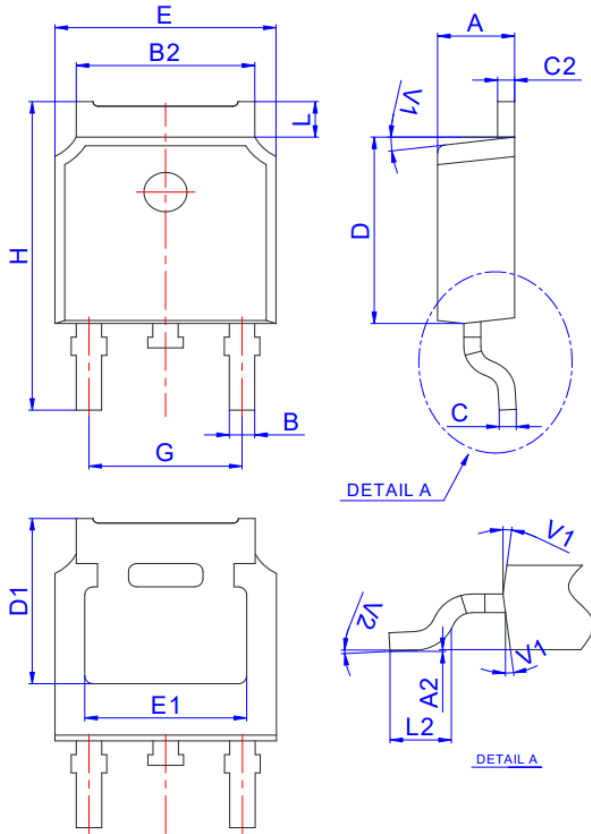
Fig 14. Unclamped Inductive Switching Circuit & Waveforms





**PACKAGE INFORMATION**

Dimension in TO-252 (Unit: mm)



Symbol	Min.	Max.
A	2.100	2.500
A2	0.000	0.100
B	0.660	0.860
B2	5.180	5.480
C	0.400	0.600
C2	0.440	0.580
D	5.900	6.300
D1	5.300REF	
E	6.400	6.800
E1	4.630	-
G	4.470	4.670
H	9.500	10.70
L	1.090	1.210
L2	1.350	1.650
V1	7°	
V2	0°	6°



## IMPORTANT NOTICE

AiT Semiconductor Inc. (AiT) reserves the right to make changes to any its product, specifications, to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

AiT Semiconductor Inc. integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life support applications, devices or systems or other critical applications. Use of AiT products in such applications is understood to be fully at the risk of the customer. As used herein may involve potential risks of death, personal injury, or server property, or environmental damage. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

AiT Semiconductor Inc. assumes to no liability to customer product design or application support. AiT warrants the performance of its products of the specifications applicable at the time of sale.