MS40P05(AU)

P-Channel 40-V (D-S) MOSFET

Description

The device is the highest performance trench P-ch MOSFETs with extreme high cell density, which provide excellent RDS(ON) and gate charge for most of the synchronous buck converter applications.

The device meets the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Features

- $R_{DS(ON)}$ =70mΩ @ V_{GS} =-10V
- $R_{DS(ON)}$ =100mΩ @ V_{GS} =-4.5V
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

Typical Applications

- MB / VGA / Vcore
- POL Applications
- Load Switch
- AEC-Q101 qualification available for suffix-AU

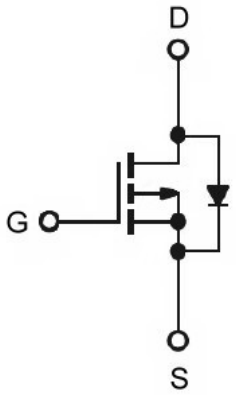
Package type：SOT-23

Packing & Order Information

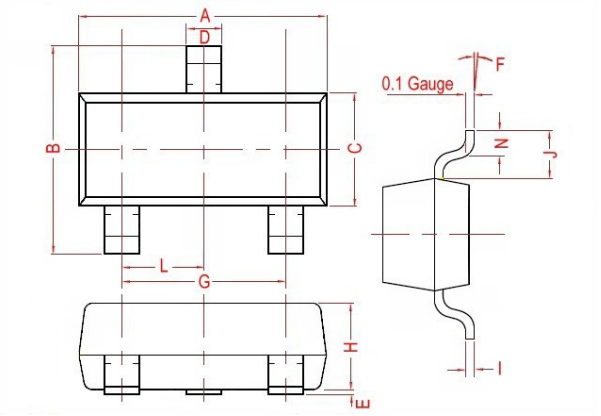
3,000/Reel

AEC-Q101
Qualification Available

Graphic Symbol

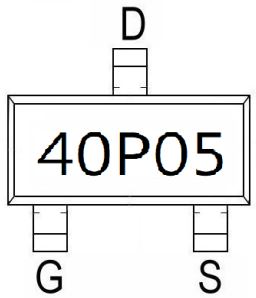


Package Dimension



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.70	3.10	G	1.90 Ref.	
B	2.30	3.00	H	0.90	1.30
C	1.20	1.75	I	0.05	0.21
D	0.30	0.50	J	0.58 Ref.	
E	0.01	0.15	L	0.95 Typ.	
F	0°	10°	N	0.20 Min.	

Marking



RoHS Compliant

MS40P05AU

P-Channel 40-V (D-S) MOSFET

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
VDS	Drain-Source Voltage	-40	V
VGS	Gate-Source Voltage	±20	V
ID	Continuous Drain Current[1] (TA =25°C)	-4.6	A
	Continuous Drain Current[1] (TA =100°C)	-2	A
IDM	Pulsed Drain Current[1,2]	-18	A
IAS	Single Pulse Avalanche Current, L =0.1mH[3]	-13	A
EAS	Single Pulse Avalanche Energy, L =0.1mH[3]	8.4	mJ
PD	Power Dissipation[4] (TA =25°C)	2.5	W
TJ/TSTG	Operating Junction and Storage Temperature	-55 to +175	°C

Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient[1]	125	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case[1]	80	°C/W

MS40P05AU

P-Channel 40-V (D-S) MOSFET

Electrical Characteristics (T_J=25°C unless otherwise specified)						
Symbol	**Parameter**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
$V_{GS\ (th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =-250μA	-1.0	-	-2.5	V
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} =0V, I_D =-250μA	-40	-	-	V
g_{fs}	Forward Transconductance	V_{DS} =-5V, I_D =-3A	-	5.8	-	S
I_{GSS}	Gate-Source Leakage Current	V_{DS} =0V, V_{GS} =±20V	-	-	±100	nA
I_{DSS}	Drain-Source Leakage Current	V_{DS} =-36V, V_{GS} =0V, T_J =25°C V_{DS} =-36V, V_{GS} =0V, T_J =55°C	-	-	-1 -10	μA
$R_{DS\ (on)}$	Drain-Source On-Resistance[2]	V_{GS} =-10V, I_D =-3A V_{GS} =-4.5V, I_D =-2A	- -	- -	70 100	mΩ
EAS	Single Pulse Avalanche Energy[5]	V_{DD} =-25V, I_{AS} =-3.5A	6.1	-	-	mJ
V_{SD}	Diode Forward Voltage[2]	IS = -1A, VGS = 0, V T_J =25°C	-	-	-1.2	V
I_S	Continuous Source Current[1,6]	V_G =V_D =0V, Force Current	-	-	-3.2	A
I_{SM}	Pulsed Source Current[2,6]		-	-	-16	A

MS40P05AU

P-Channel 40-V (D-S) MOSFET

Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge[2]	V_{DS} =-32V	--	6.4	--	nC
Q_{gs}	Gate-Source Charge	I_D =-3A	--	2.1	--	
Q_{gd}	Gate-Drain Charge	V_{GS} =-4.5V	--	2.5	--	
$t_{d(on)}$	Turn-On Delay Time[2]	V_{DS} =-20V	--	4.2	--	ns
t_r	Rise Time	I_D =-3A	--	23	--	
$t_{d(off)}$	Turn-Off Delay Time	V_{GS} =-4.5V	--	26.8	--	
t_f	Fall Time	R_G =3.3Ω	--	20.6	--	
C_{ISS}	Input Capacitance	V_{DS} =-15V	--	620	--	pF
C_{OSS}	Output Capacitance	V_{GS} =0V	--	65	--	
C_{RSS}	Reverse Transfer Capacitance	f =1.0MHz	--	53	--	
Rg	Gate Resistance	V_{DS} =0V, f =1.0MHz	--	4.3	--	Ω

Notes

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. The EAS data shows maximum rating. The test condition is V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-13A.
4. The power dissipation is limited by 175℃ junction temperature.
5. The Min. value is 100% EAS tested guarantee.
6. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

MS40P05AU

P-Channel 40-V (D-S) MOSFET

- **Typical Electrical Characteristics**

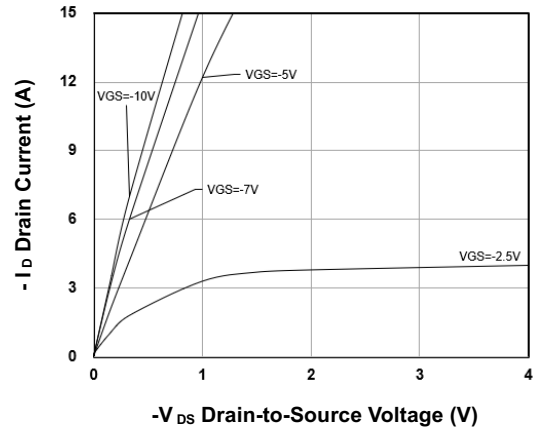


FIG.1-Output Characteristics T_J=25°C

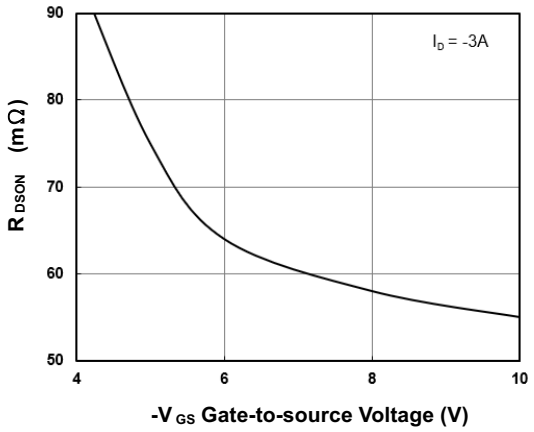


FIG.2-On-Resistance vs. G-S Voltage

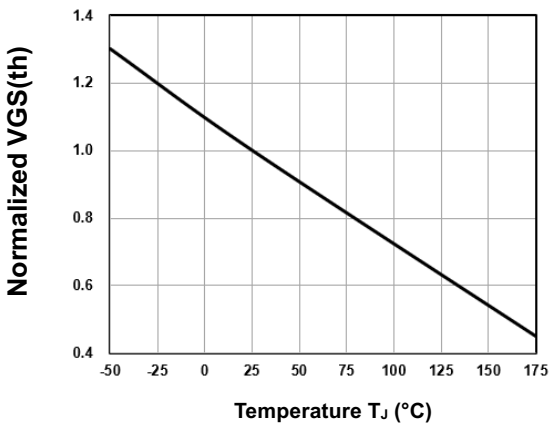


FIG.3- Normalized VGS(th) vs. TJ

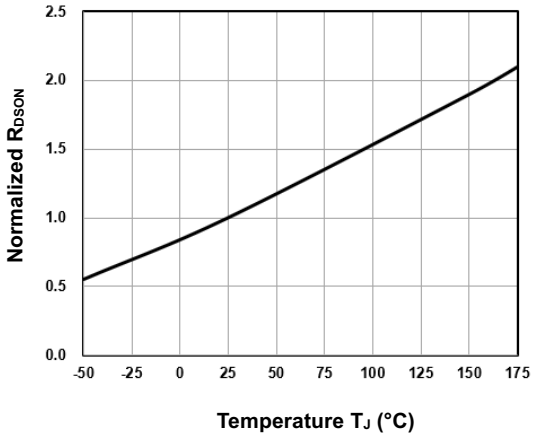


FIG.4-Normalized R_{DSON} vs. Temperature T_J

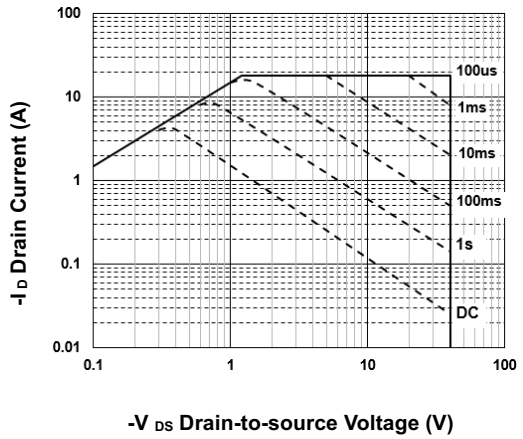


FIG.5- Safe Operating Area

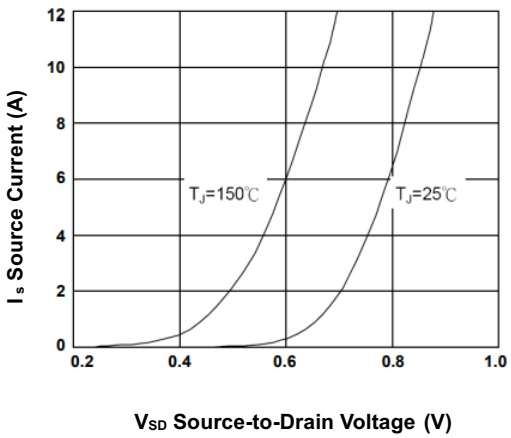


FIG.6- Forward Characteristics of Reverse

MS40P05AU

P-Channel 40-V (D-S) MOSFET

- **Typical Electrical Characteristics**

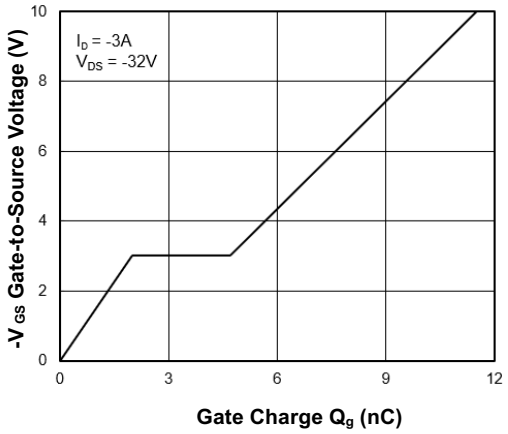


FIG.7- Gate Charge Characteristics

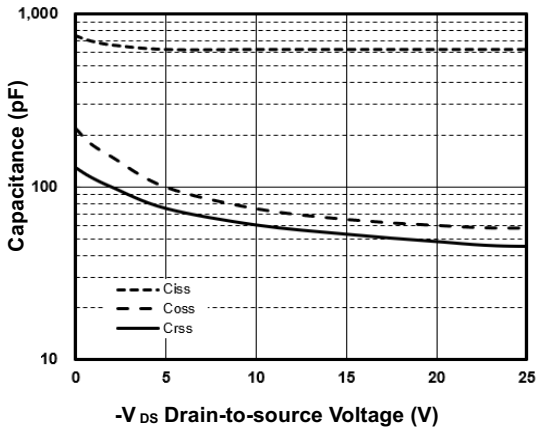


FIG.8-Capacitance Characteristics

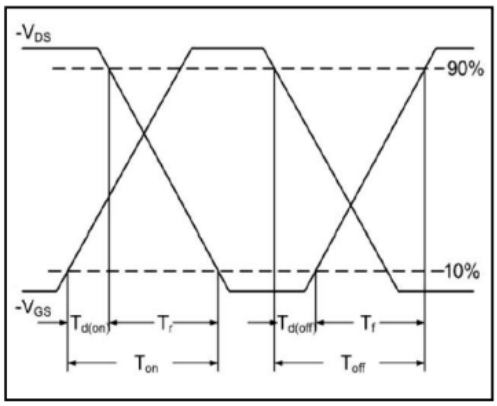


FIG.9- Switching Time Waveform

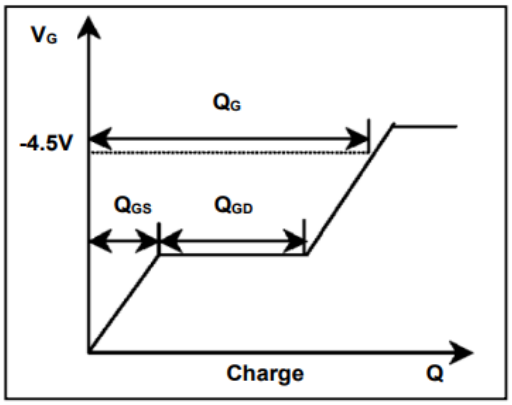


FIG.10- Gate Charge Waveform

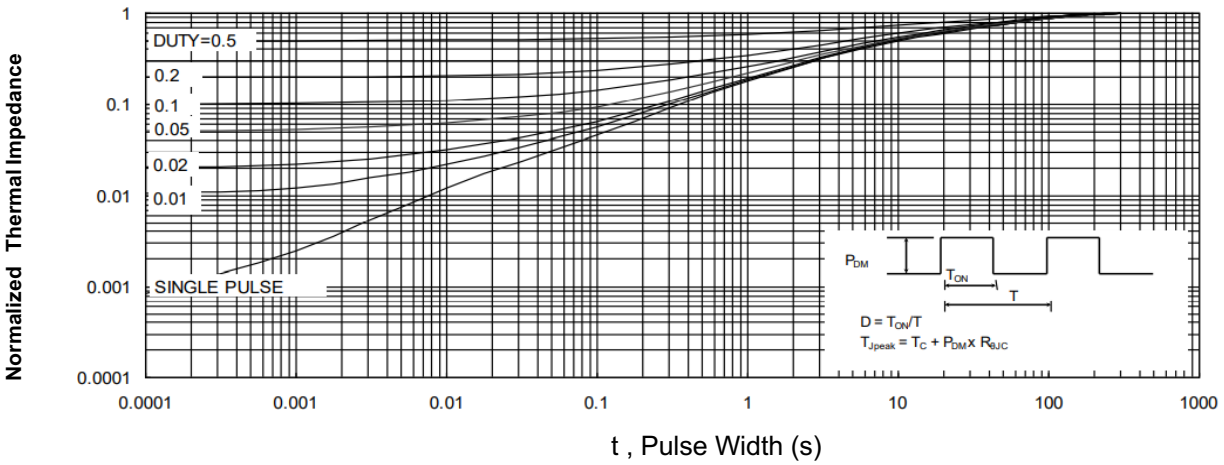


FIG.11- Normalized Maximum Transient Thermal Impedance

MS40P05AU

P-Channel 40-V (D-S) MOSFET

WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Bruckewell Technology Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Bruckewell”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Bruckewell makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Bruckewell disclaims

(i) Any and all liability arising out of the application or use of any product.

(ii) Any and all liability, including without limitation special, consequential or incidental damages.

(iii) Any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Bruckewell’s knowledge of typical requirements that are often placed on Bruckewell products in generic applications.

Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time.

Product specifications do not expand or otherwise modify Bruckewell’s terms and conditions of purchase, including but not limited to the warranty expressed therein.