

# MSD69P05

## P-Channel 60V MOSFETs

### Description

These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

### Features

- -60V, -20A,  $R_{DS(ON)} = 48m\Omega @ V_{GS} = -10V$
- Improved dv/dt capability
- Green Device Available
- 100% EAS Guaranteed
- Fast Switching
- RoHS compliant package

### Application

- Motor Drive
- Power Tools
- LED Lighting

**Package type :** TO-252

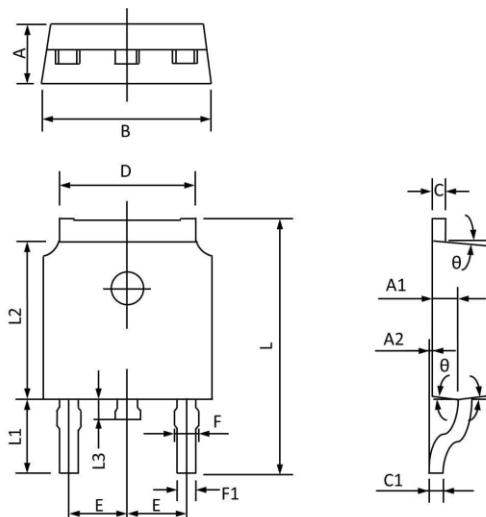
### Packing & Order Information

R : 2,500/Reel

T : 80/Tube ; 4,000/Box

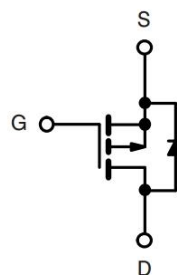


**RoHS  
COMPLIANT**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.0230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.80	10.40	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.00	6.20	0.236	0.244
L3	0.60	1.00	0.024	0.039
θ	3°		9°	

Graphic symbol



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain to Source Voltage	-60	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current ( $T_C=25^\circ C$ )	-20	A
	Continuous Drain Current ( $T_C=100^\circ C$ )	-13	A
$I_{DM}$	Drain Current Pulsed	-80	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>2</sup>	51	mJ
$I_{AS}$	Single Pulsed Avalanche Current <sup>2</sup>	-32	A

## MSD69P05

### P-Channel 60V MOSFETs

#### Absolute Maximum Ratings (Tc=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit
PD	Power Dissipation (TC = 25°C)	46	W
	Power Dissipation – Derate above 25°C	0.37	W/°C

#### Absolute Maximum Ratings (Tc=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit
T <sub>STG</sub>	Storage Temperature Range	-55 to +150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to +150	°C

#### Thermal Characteristics

Symbol	Parameter	Value			Units
		Min.	Typ.	Max.	
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case	--	--	62	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient	--	--	1.22	°C/W

#### Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

##### Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	-60	--	--	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C	--	-0.05	--	V/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> = -60 V, T <sub>J</sub> = 25°C V <sub>DS</sub> = -48 V, T <sub>J</sub> = 125°C	--	--	-1 -10	uA
I <sub>GSS</sub>	Gate-Source Leakage, Forward	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V	--	--	±100	nA

##### On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 uA	-1.2	-1.6	-2.5	V
R <sub>DS(ON)</sub>	Static Drain-Source On-state Resis-tance	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -8 A V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -4 A		39 53	48 65	mΩ
ΔV <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 uA		5		mV/°C
g <sub>fs</sub>	Forward Transconductance	V <sub>GS</sub> = -10V, I <sub>D</sub> = -6 A		11		S

## MSD69P05

### P-Channel 60V MOSFETs

#### Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$Q_g$	Total Gate Charge <sup>3,4</sup>	$V_{DS} = -30\text{ V}$ , $V_{GS} = -10\text{ V}$ , $I_D = -8\text{ A}$	--	22.4	31	nC
$Q_{gs}$	Gate-Source Charge <sup>3,4</sup>		--	4.1	6	nC
$Q_{gd}$	Gate-Drain Charge <sup>3,4</sup>		--	5.2	8	nC
$t_{d(on)}$	Turn-On Delay Time <sup>3,4</sup>	$V_{DD} = -30\text{ V}$ , $I_D = -1\text{ A}$ , $V_{GS} = -10\text{ V}$ , $R_G = 6\ \Omega$	--	13	25	ns
$t_r$	Rise Time <sup>3,4</sup>		--	42.4	81	ns
$t_{d(off)}$	Turn-Off Delay Time <sup>3,4</sup>		--	64.6	123	ns
$t_f$	Fall Time <sup>3,4</sup>		--	16.4	31	ns

#### Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	--	1250	1810	pF
$C_{oss}$	Output Capacitance		--	85	125	pF
$C_{rss}$	Reverse Transfer Capacitance		--	65	95	pF
$R_g$	Gate resistance	$V_{GS} = 0\text{ V}$ , $V_{DS} = 0\text{ V}$ , $F=1\text{ MHz}$	--	15	30	$\Omega$

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

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$I_S$	Continuous Source Current	$V_D = V_G = 0\text{ V}$ Force Current	--	--	-20	A
$I_{SM}$	Pulsed Source Current		--	--	-80	A
$V_{SD}$	Diode Forward Voltage	$I_S = -1\text{ A}$ , $V_{GS} = 0\text{ V}$ , $T_J = 25^\circ\text{C}$	--	--	-1	V
$t_{rr}$	Reverse Recovery Time <sup>3</sup>	$V_{GS} = 0$ , $I_S = -1\text{ A}$ , $dI/dt = 100\text{ A/us}$ , $T_J = 25^\circ\text{C}$	--	--	--	ns
$Q_{rr}$	Reverse Recovery Charge <sup>3</sup>		--	--	--	uC

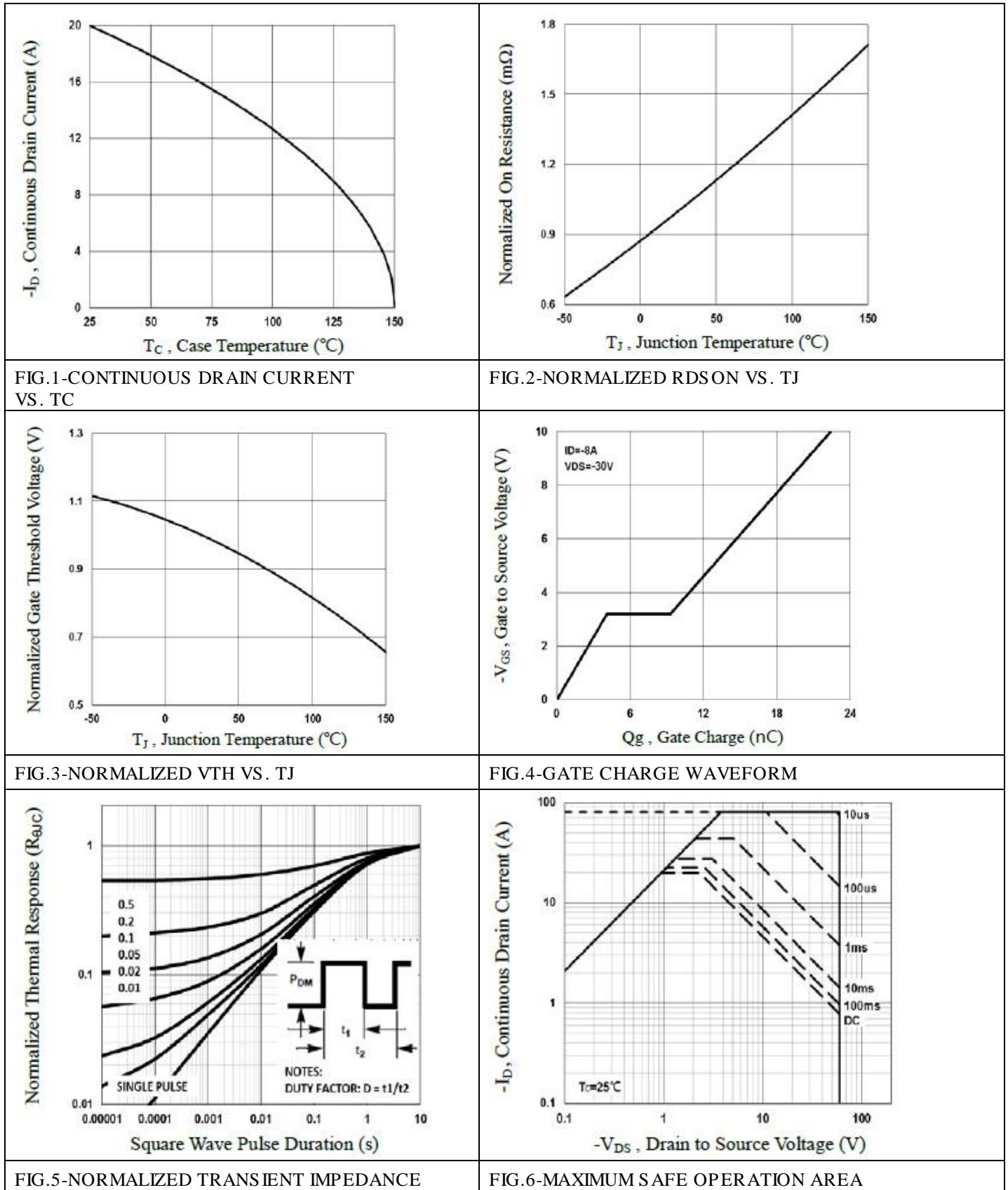
Note :

- 1.Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD} = -25\text{ V}$ ,  $V_{GS} = -10\text{ V}$ ,  $L = 0.1\text{ mH}$ ,  $I_{AS} = -32\text{ A}$ ,  $R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$
- 3.The data tested by pulsed , pulse width  $\leq 300\text{ us}$  , duty cycle  $\leq 2\%$ .
- 4.Essentially independent of operating temperature.

## MSD69P05

### P-Channel 60V MOSFETs

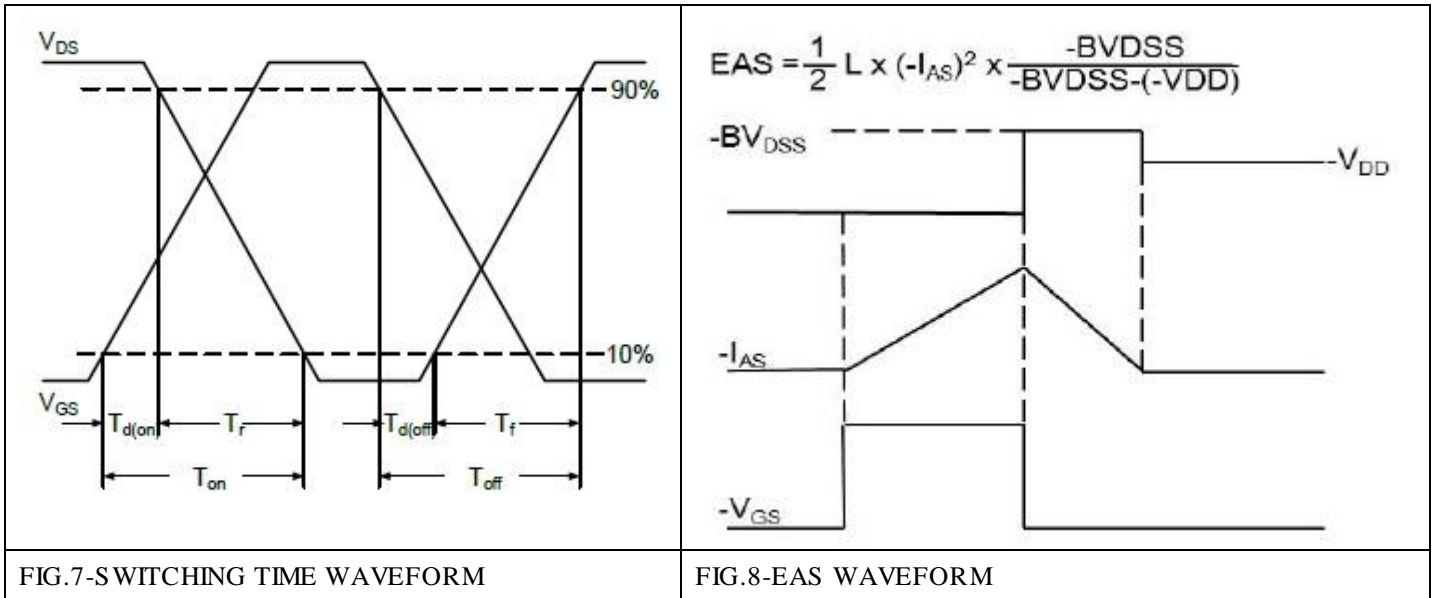
#### Characteristics Curve



# MSD69P05

P-Channel 60V MOSFETs

■ Characteristics Curve



## MS D69P05

### P-Channel 60V MOSFETs

#### Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE

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.