

## -350V P-Channel Enhancement Mode MOSFET

### Description

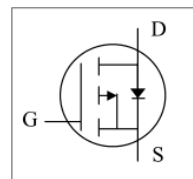
The HM05P35MR uses advanced trench technology

to provide excellent  $R_{DS(ON)}$ , low gate charge and

operation with gate voltages as low as 4.5V. This

device is suitable for use as a

Battery protection or in other Switching application.



### General Features

$V_{DS} = -350V$   $I_D = -0.5 A$

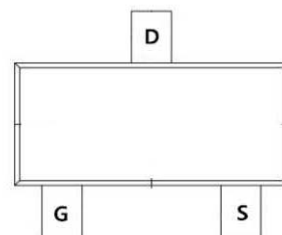
$R_{DS(ON)} < 18m\Omega$  @  $V_{GS}=10V$

### Application

Battery protection

Load switch

Uninterruptible power supply



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
HM05P35MR	SOT23-3L	3P10	3000

### Absolute Maximum Ratings ( $T_c=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-350	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A = 25^{\circ}C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-0.5	A
$I_D @ T_A = 70^{\circ}C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-0.35	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-1.5	A
$P_D @ T_A = 25^{\circ}C$	Total Power Dissipation <sup>3</sup>	1	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^{\circ}C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	125	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	80	$^{\circ}C/W$

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Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise noted)

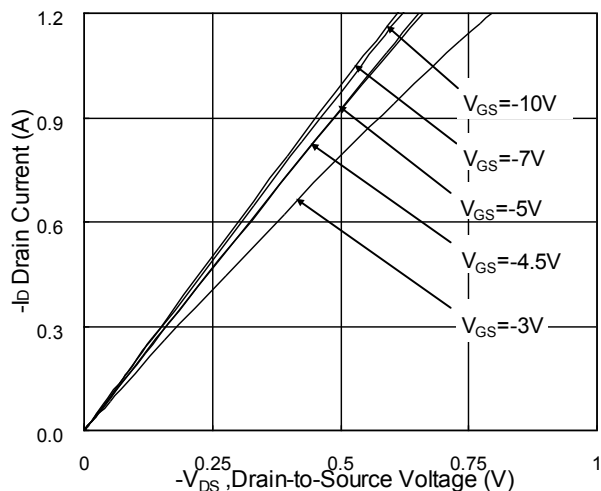
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V$ , $I_D=-250\mu A$	-350	---	---	V
$\Delta BVDSS/\Delta T_J$	BVDSS Temperature Coefficient	Reference to $25^{\circ}\text{C}$ , $I_D=-1mA$	---	-0.0624	---	V/ $^{\circ}\text{C}$
RDS(ON)	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-10V$ , $I_D=-0.8A$	---	15.5	18	m $\Omega$
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}$ , $I_D=-250\mu A$	-1.1	---	-2.1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.5	---	mV/ $^{\circ}\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=-80V$ , $V_{GS}=0V$ , $T_J=25^{\circ}\text{C}$	---	---	10	$\mu A$
		$V_{DS}=-80V$ , $V_{GS}=0V$ , $T_J=55^{\circ}\text{C}$	---	---	100	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V$ , $V_{DS}=0V$	---	---	$\pm 100$	nA
gfs	Forward Transconductance	$V_{DS}=-5V$ , $I_D=-0.8A$	---	3	---	S
Rg	Gate Resistance	$V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$	---	16	32	$\Omega$
Qg	Total Gate Charge (-4.5V)	$V_{DS}=-15V$ , $V_{GS}=-4.5V$ , $I_D=-0.5A$	---	4.5	---	nC
Qgs	Gate-Source Charge		---	1.14	---	
Qgd	Gate-Drain Charge		---	1.5	---	
Td(on)	Turn-On Delay Time	$V_{DD}=-50V$ , $V_{GS}=-10V$ , $R_G=3.3\Omega$ , $I_D=-0.5A$	---	13.6	---	ns
Tr	Rise Time		---	6.8	---	
Td(off)	Turn-Off Delay Time		---	34	---	
Tf	Fall Time		---	3	---	
Ciss	Input Capacitance	$V_{DS}=-15V$ , $V_{GS}=0V$ , $f=1MHz$	---	553	---	pF
Coss	Output Capacitance		---	29	---	
Crss	Reverse Transfer Capacitance		---	20	---	
IS	Continuous Source Current <sup>1,4</sup>	$V_G=V_D=0V$ , Force Current	---	---	-0.9	A
ISM	Pulsed Source Current <sup>2,4</sup>		---	---	-1.8	A
VSD	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V$ , $I_S=-1A$ , $T_J=25^{\circ}\text{C}$	---	---	-1.2	V

Note :

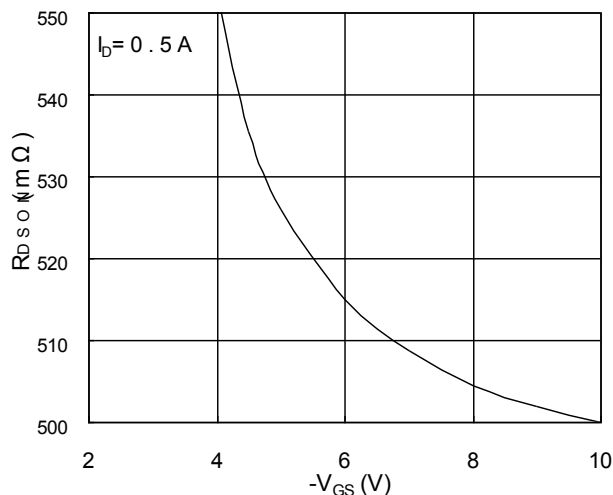
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The power dissipation is limited by  $150^{\circ}\text{C}$  junction temperature
- 4 .The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

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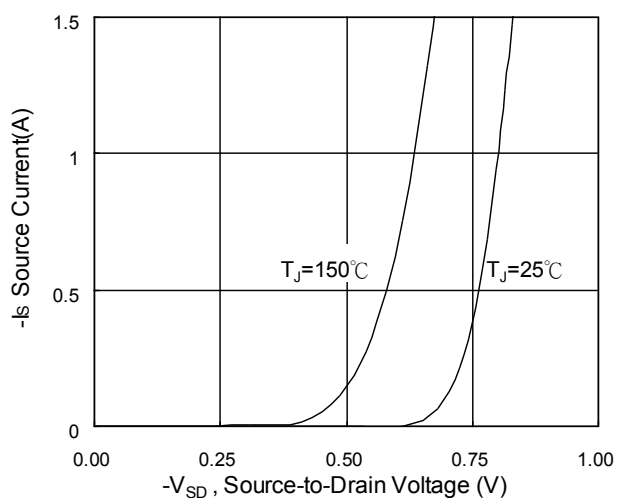
### Typical Characteristics



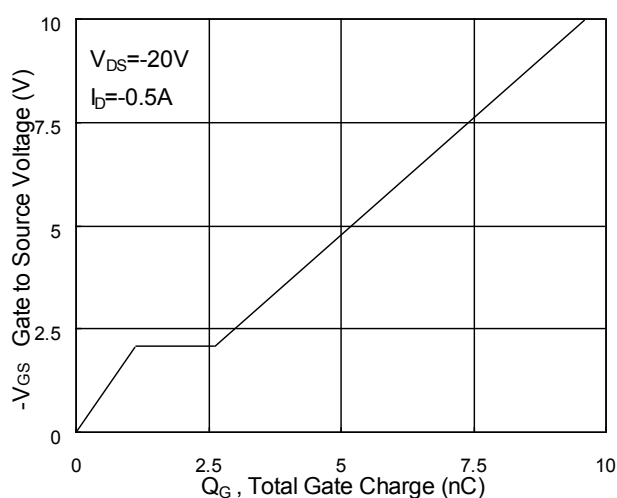
**Fig.1 Typical Output Characteristics**



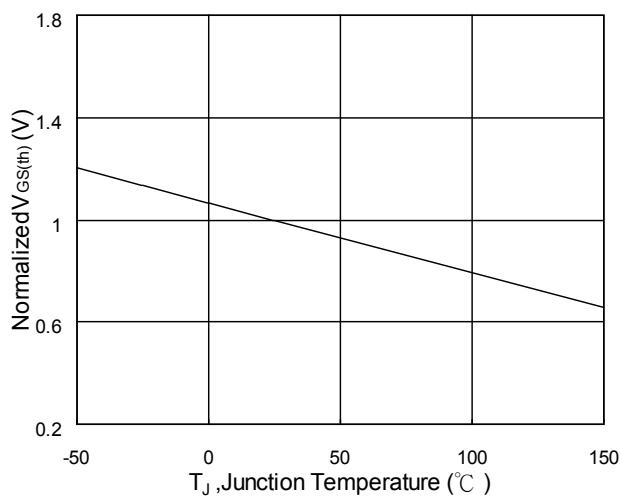
**Fig.2 On-Resistance vs. Gate-Source**



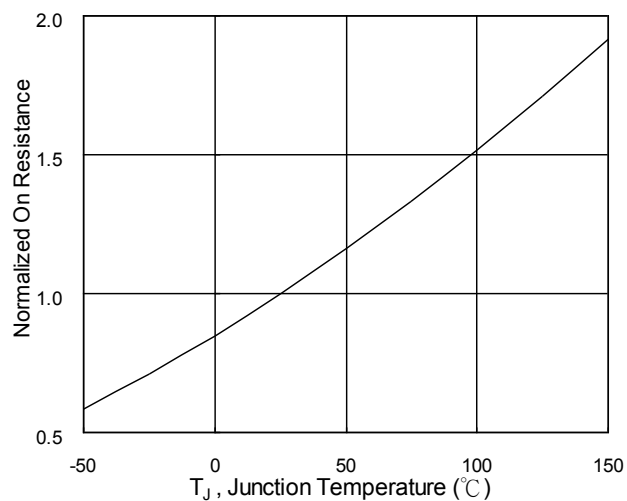
**Fig.3 Forward Characteristics Of Reverse**



**Fig.4 Gate-Charge Characteristics**

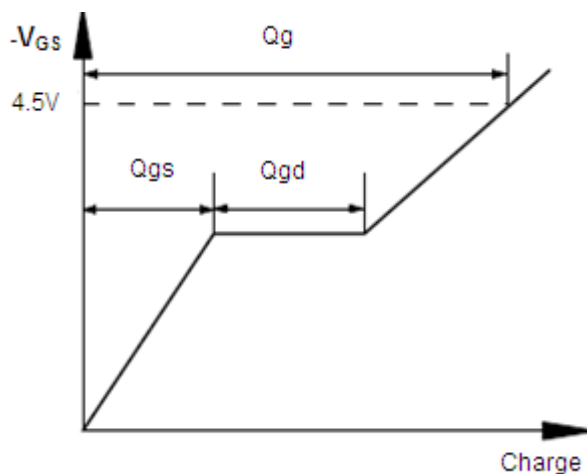
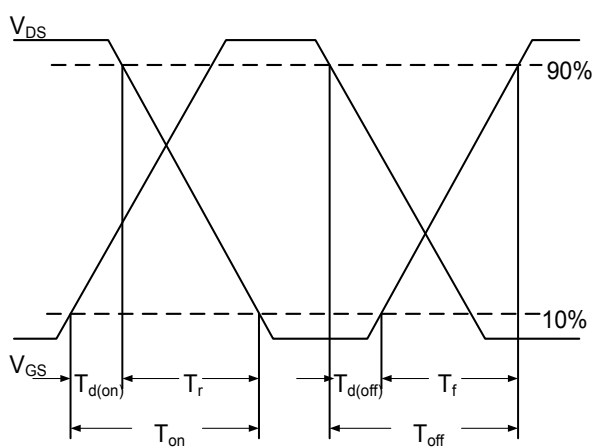
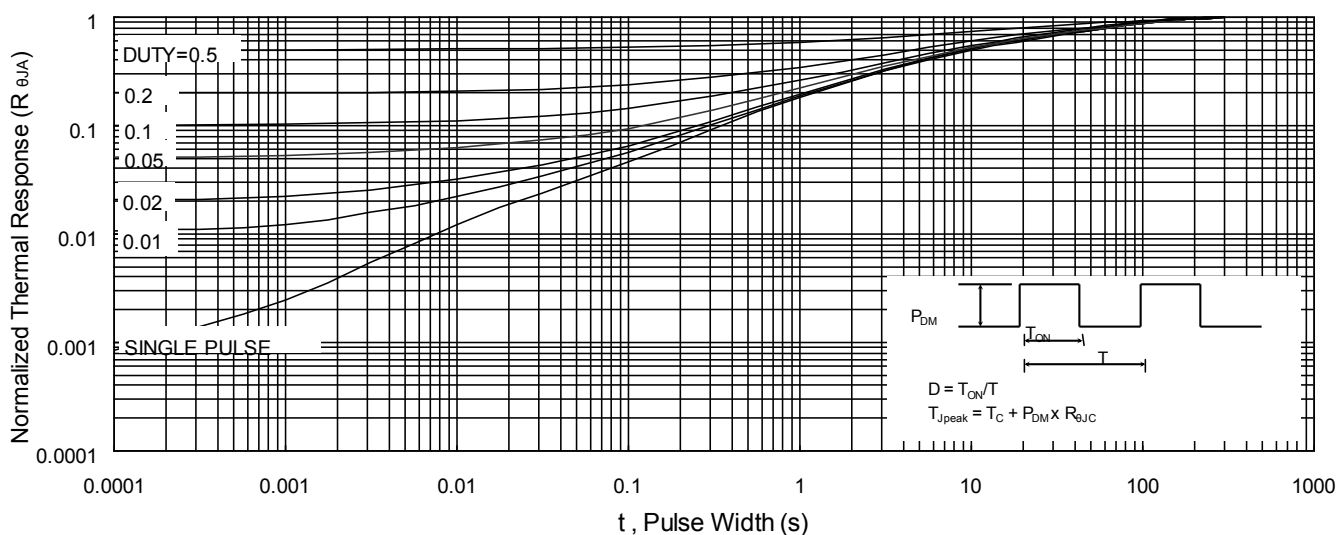
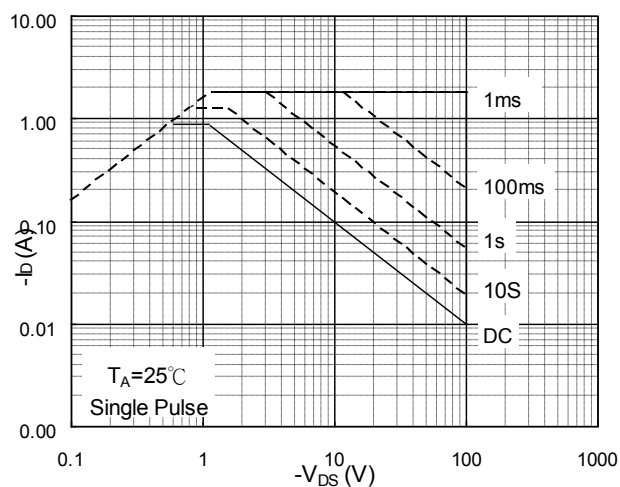
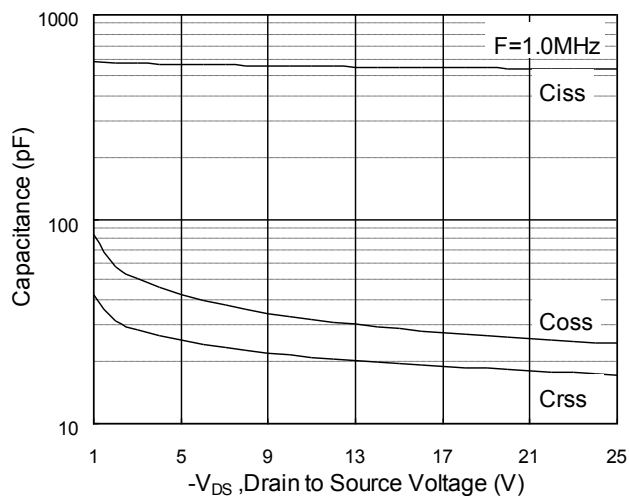


**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**

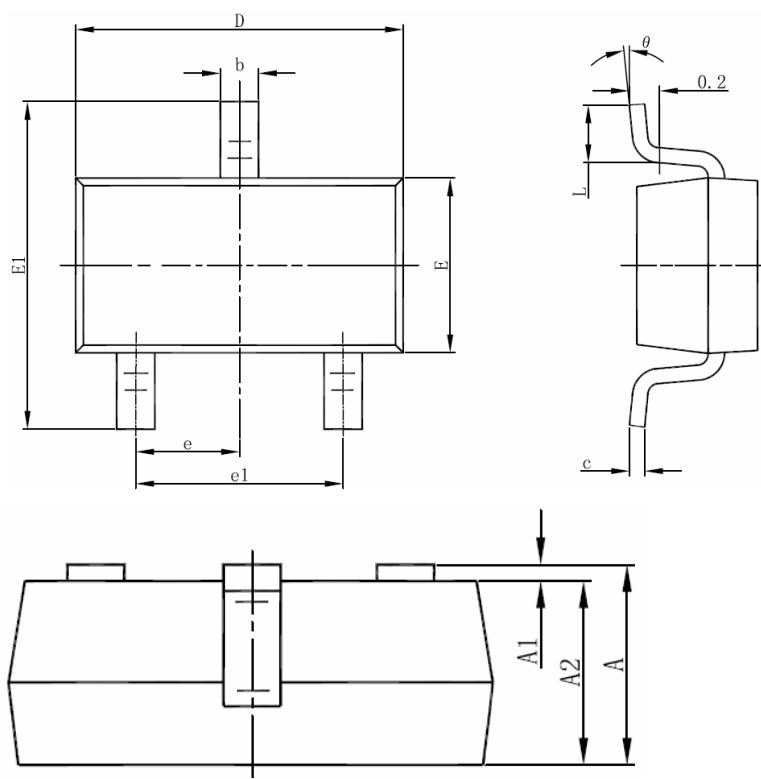


**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**

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## SOT-23-3L PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

### NOTES

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10\text{mm}$  (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.