

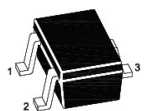
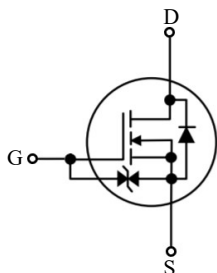


# MMBT7002KWH

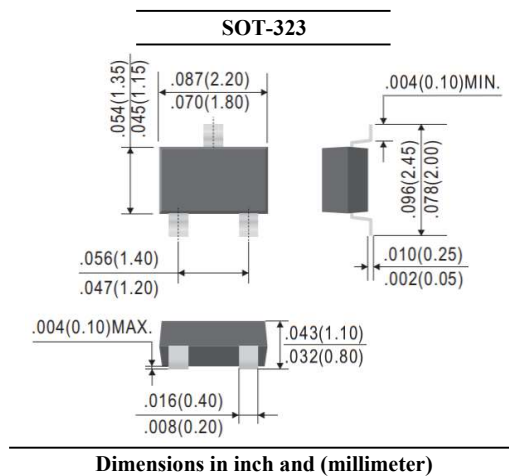
## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- Low on resistance  $R_{DS(ON)}$
- Low gate threshold voltage
- Low input capacitance
- ESD protected HMB  $\geq 2KV$
- Suffix "H" indicates Halogen-free parts, ex. MMBT7002KWH



1.Gate 2.Source 3.Drain



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	60	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current (Continuous)	$I_D$	300	mA
Drain Current (Pulse Width $\leq 10\text{ }\mu\text{s}$ )	$I_{DM}$	800	mA
Total Power Dissipation	$P_{tot}$	200	mW
Thermal Resistance From Junction to Ambient (Note 1)	$R_{\theta JA}$	625	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	$^\circ\text{C}$

Note :

1. Device mounted on FR-4 substrate PC board, with minimum recommended pad layout



# MMBT7002KWH

## N-Channel Enhancement Mode Field Effect Transistor

### Electrical Characteristics ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise specified)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain Source Breakdown Voltage	$I_D = 10\mu\text{A}$	$BV_{DSS}$	60	-	-	V
Zero Gate Voltage Drain Current	$V_{DS} = 60\text{V}$	$I_{DSS}$	-	-	1	$\mu\text{A}$
Gate Source Leakage Current	$V_{GS} = \pm 20\text{V}$	$I_{GSS}$	-	-	$\pm 10$	$\mu\text{A}$
Gate Threshold Voltage	$V_{DS} = 10\text{V}, I_D = 250\mu\text{A}$	$V_{GS(th)}$	1.0	-	2.5	V
Static Drain Source On-Resistance	$V_{GS} = 10\text{V}, I_D = 500\text{mA}$	$R_{DS(on)}$	-	-	3	$\Omega$
	$V_{GS} = 4.5\text{V}, I_D = 200\text{mA}$		-	-	4	
Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 200\text{mA}$	$g_{FS}$	80	-	-	mS
<b>Dynamic</b>						
Gate Resistance	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V},$ $f = 1\text{MHz}$	$R_g$	-	200	-	$\Omega$
Total Gate Charge	$V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V},$ $I_D = 0.5\text{A}$	$Q_g$	-	0.44	-	nC
Gate-Source Charge		$Q_{gs}$	-	0.20	-	
Gate-Drain Charge		$Q_{gd}$	-	0.10	-	
Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 25\text{V},$ $f = 1\text{MHz}$	$C_{iss}$	-	22.5	50.0	pF
Output Capacitance		$C_{oss}$	-	9.0	25.0	
Reverse Transfer Capacitance		$C_{rss}$	-	7.5	10.0	
Turn-On Delay Time	$V_{DS} = 30\text{V}, I_D = 0.5\text{A},$ $V_{GS} = 10\text{V}, R_G = 25\Omega$	$t_{d(on)}$	-	2.7	-	ns
Turn-On Rise Time		$t_r$	-	2.5	-	
Turn-Off Delay Time		$t_{d(off)}$	-	13.0	-	
Turn-Off Fall Time		$t_f$	-	8.0	-	
<b>Drain-Source Body Diode</b>						
Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 0.5\text{A}$	$V_{SD}$	-	0.85	-	V
Reverse Recovery Time	$I_S = 0.5\text{A}, dI/dt = 100\text{A}/\mu\text{s}$	$t_{rr}$	-	30	-	ns
Reverse Recovery Charge		$Q_{rr}$	-	29	-	nC



### RATINGS AND CHARACTERISTIC CURVES

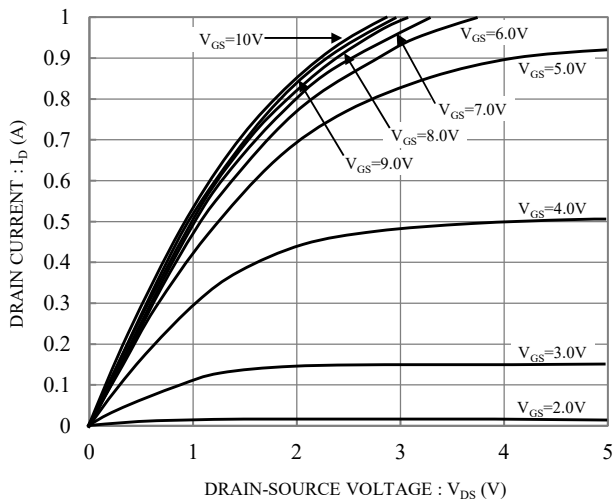


Fig.1 Typical Output Characteristics

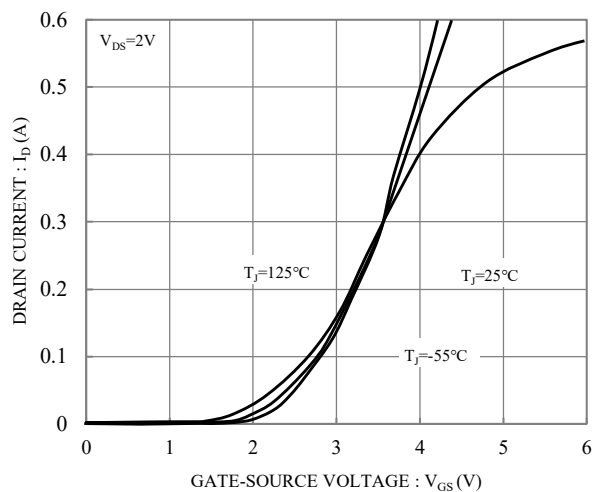


Fig.2 Typical Transfer Characteristics

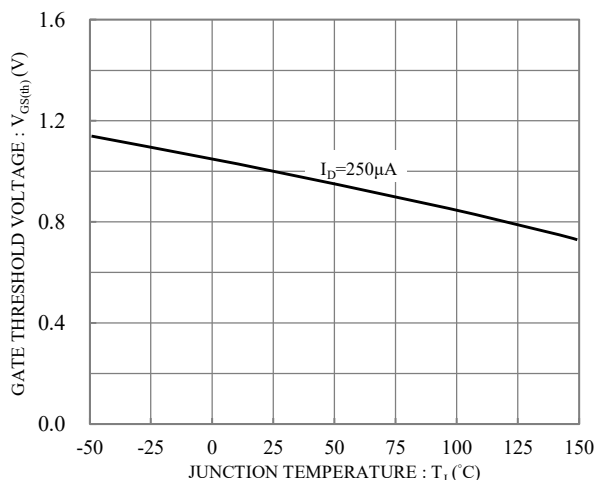


Fig.3 Gate Threshold Voltage vs. Junction Temperature

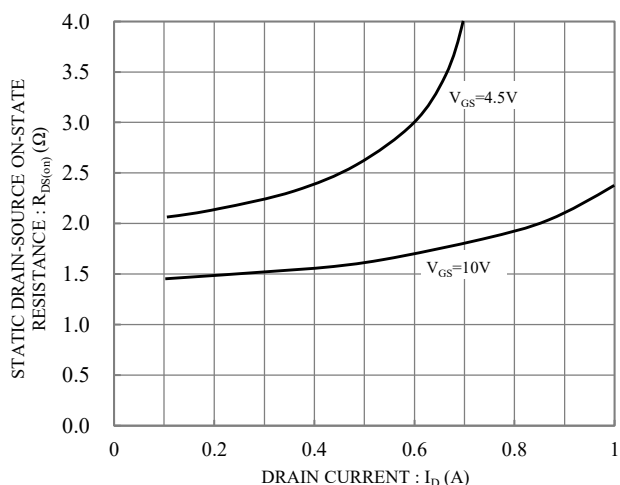


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

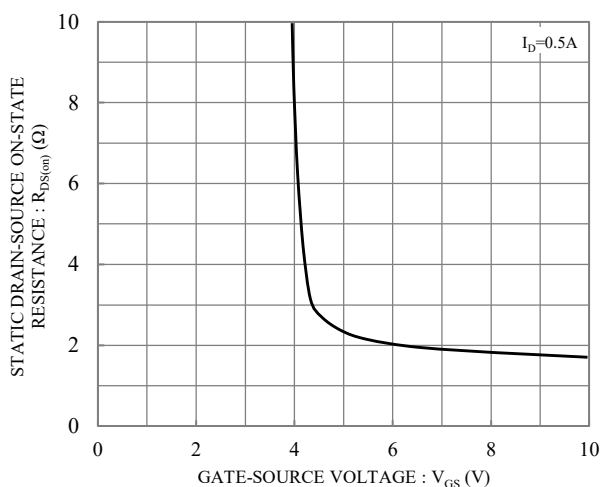


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

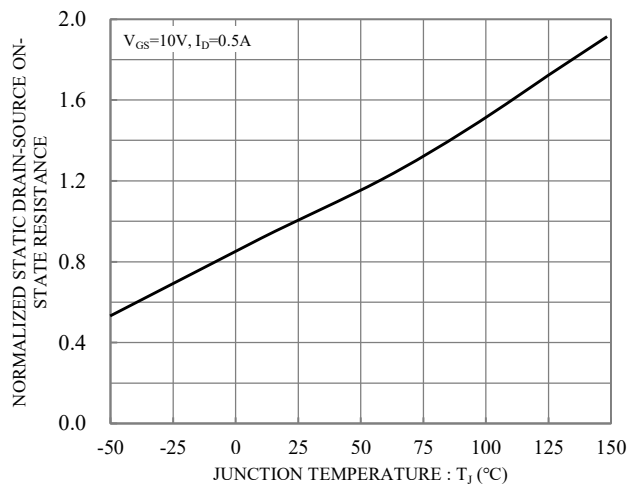
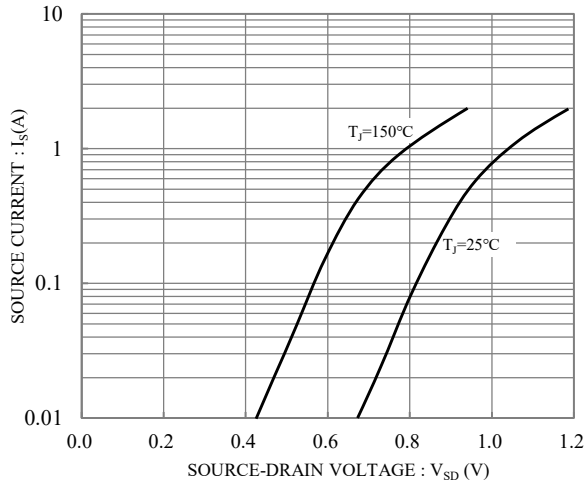


Fig.6 Normalized Static Drain-Source On-state Resistance vs. Junction Temperature

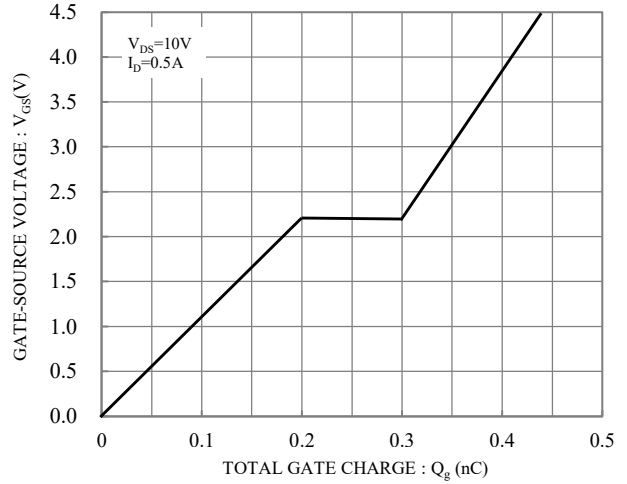


# MMBT7002KWH

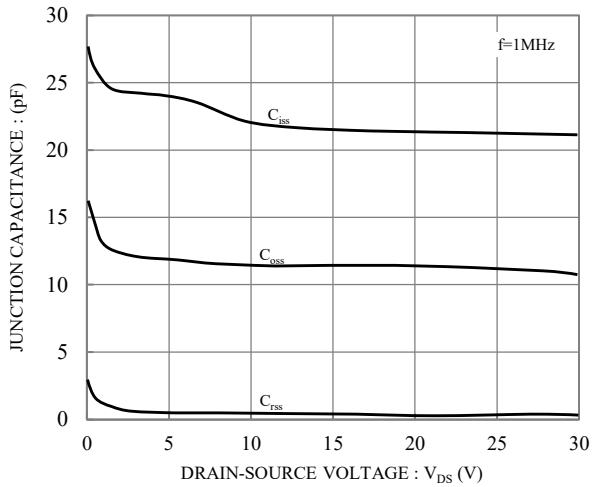
## N-Channel Enhancement Mode Field Effect Transistor



**Fig.7 Diode Forward Voltage vs. Source Current**



**Fig.8 Gate Charge Characteristics**



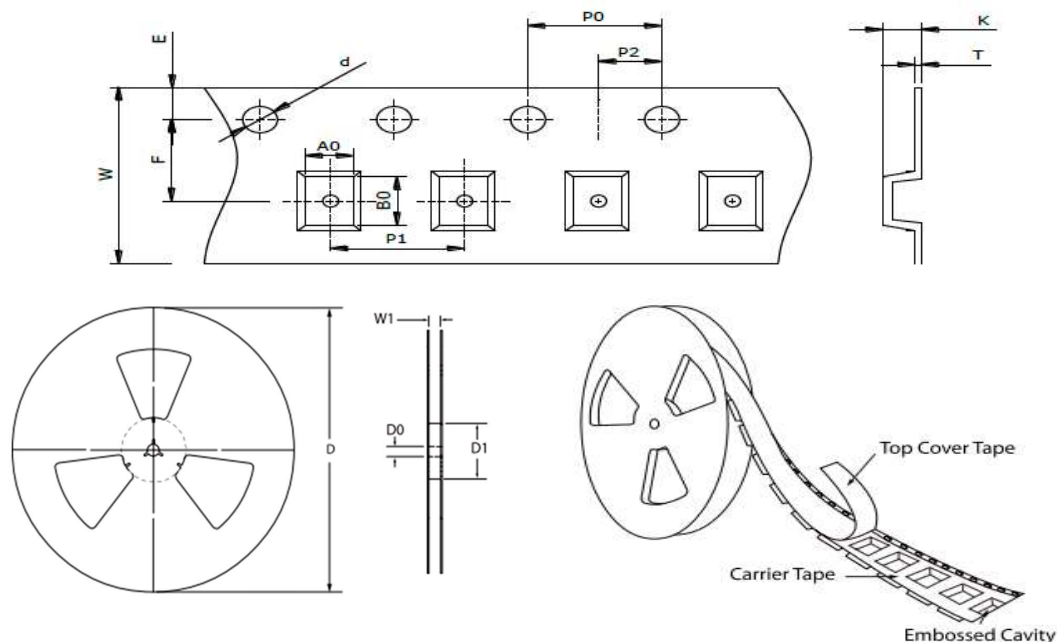
**Fig.9 Capacitance vs. Drain-Source Voltage**



# MMBT7002KWH

## N-Channel Enhancement Mode Field Effect Transistor

### TAPE & REEL SPECIFICATION



Item	Symbol	SOT-323
Carrier width	A <sub>0</sub>	2.30 ± 0.10
Carrier length	B <sub>0</sub>	2.55 ± 0.10
Carrier depth	K	1.20 ± 0.10
Sprocket hole	d	1.50 ± 0.10
Reel outside diameter	D	178.00 ± 2.00
Feed hole width	D <sub>0</sub>	13.00 ± 0.50
Reel inner diameter	D <sub>1</sub>	MIN. 50.00
Sprocket hole position	E	1.75 ± 0.10
Punch hole position	F	3.50 ± 0.10
Sprocket hole pitch	P <sub>0</sub>	4.00 ± 0.10
Punch hole pitch	P <sub>1</sub>	4.00 ± 0.10
Embossment center	P <sub>2</sub>	2.00 ± 0.10
Overall tape thickness	T	0.20 ± 0.05
Tape width	W	8.00 ± 0.20
Reel width	W <sub>1</sub>	MAX. 14.50

### ORDER INFORMATION

Package	Reel Size	Quantity
SOT-323	7"	3,000

### MARKING CODE

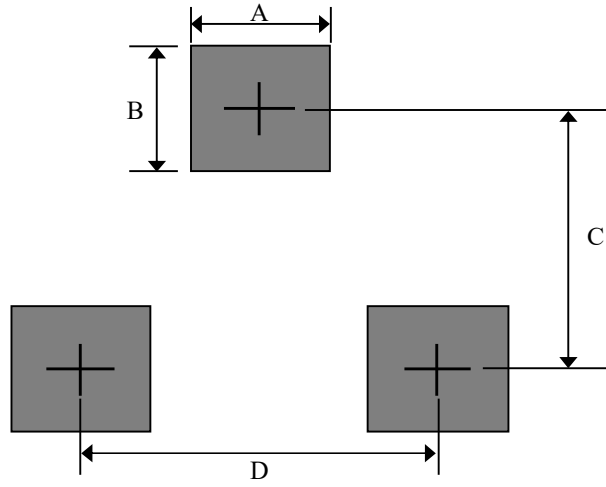
Part Number	Marking Code
MMBT7002KWH	K72



# MMBT7002KWH

*N-Channel Enhancement Mode Field Effect Transistor*

## SUGGESTED SOLDER PAD LAYOUT



Unit : mm

PACKAGE	A	B	C	D
SOT-323	0.80	0.80	1.60	1.30