

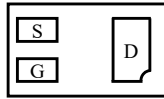


MMBT7002KLPH

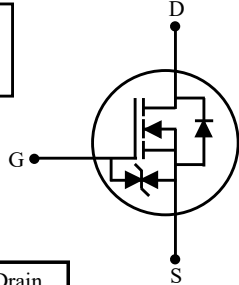
N-Channel Enhancement Mode Field Effect Transistor

FEATURES

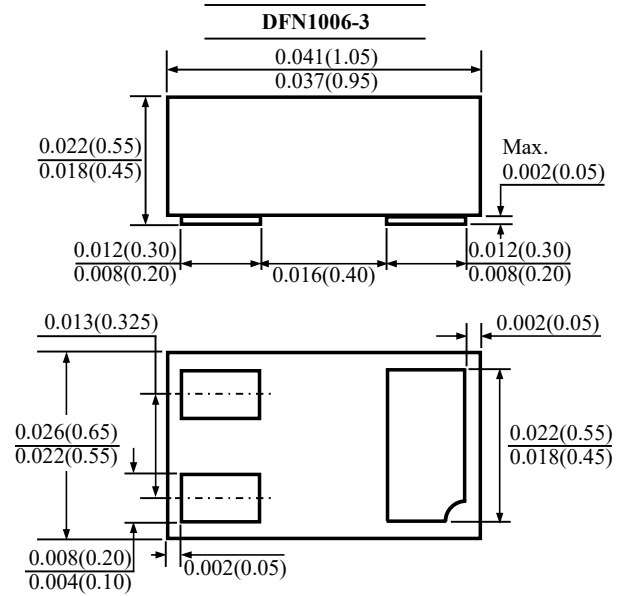
- Low on resistance $R_{DS(ON)}$
- Low gate threshold voltage
- Low input capacitance
- ESD protected gate
- Suffix "H" indicates Halogen-free parts, ex. MMBT7002KLPH



Bottom View



D	Drain
G	Gate
S	Source



Dimensions in inch and (millimeter)

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	V
Gate-Source Voltage	V_{GSS}	± 20	V
Drain Current (Note 1)	I_D	450	mA
Peak Drain Current, pulsed	I_{DM}	1.8	A
Power Dissipation (Note 2)	P_D	360	mW
(Note 3)		715	
Operating and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Note :

1. Pulse test: Pulse width $\leq 100\mu\text{s}$, Duty cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.
2. Device mounted on FR-4 substrate PC board, with minimum recommended pad layout.
3. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.



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

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Static						
Drain Source Breakdown Voltage	$I_D = 250\mu\text{A}$	BV_{DSS}	60	-	-	V
Zero Gate Voltage Drain Current	$V_{DS} = 60\text{V}$	I_{DSS}	-	-	1	μA
Gate Source Leakage Current	$V_{GS} = \pm 20\text{V}$	I_{GSS}	-	-	± 10	μA
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	$V_{GS(th)}$	1.1	-	2.1	V
Static Drain Source On-Resistance	$V_{GS} = 10\text{V}, I_D = 450\text{mA}$	$R_{DS(on)}$	-	-	1.6	Ω
	$V_{GS} = 5\text{V}, I_D = 50\text{mA}$		-	-	2.0	
Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 200\text{mA}$	g_{FS}	-	307	-	mS
Dynamic						
Gate Resistance	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	R_g	-	37	-	Ω
Total Gate Charge	$V_{DS} = 30\text{V}, I_D = 1\text{A}, V_{GS} = 10\text{V}$	Q_g	-	1.3	-	nC
Gate-Source Charge		Q_{gs}	-	0.5	-	
Gate-Drain Charge		Q_{gd}	-	0.2	-	
Input Capacitance	$V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	C_{iss}	-	31	-	pF
Output Capacitance		C_{oss}	-	11	-	
Reverse Transfer Capacitance		C_{rss}	-	8	-	
Turn-On Delay Time	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, I_D = 1\text{A}, R_g = 6.8\Omega$	$t_{d(on)}$	-	4.8	-	ns
Turn-On Rise Time		t_r	-	3.0	-	
Turn-Off Delay Time		$t_{d(off)}$	-	4.4	-	
Turn-Off Fall Time		t_f	-	15.0	-	
Drain-Source Body Diode						
Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 115\text{mA}$	V_{SD}	-	-	1.1	V
Reverse Recovery Time	$I_S = 1\text{A}, di/dt = 100\text{A}/\mu\text{s}$	t_{rr}	-	8.4	-	ns
Reverse Recovery Charge		Q_{rr}	-	3.6	-	nC



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RATINGS AND CHARACTERISTIC CURVES

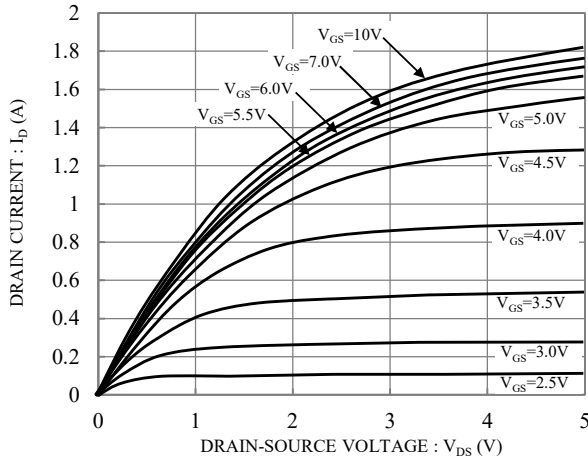


Fig.1 Typical Output Characteristics

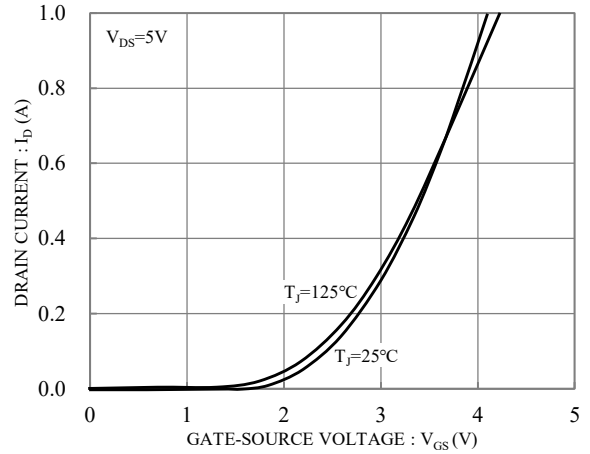


Fig.2 Typical Transfer Characteristics

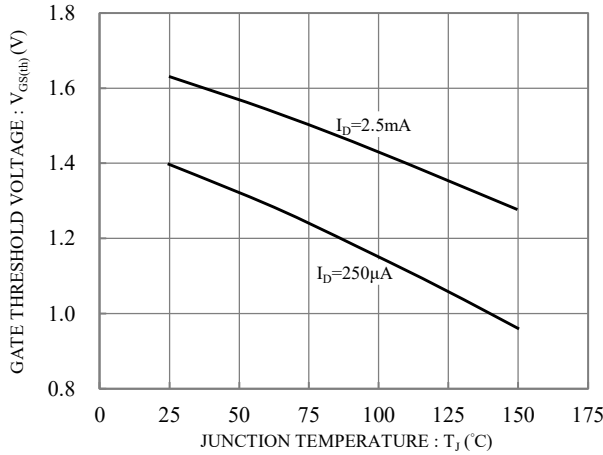


Fig.3 Gate Threshold Voltage vs. Junction Temperature

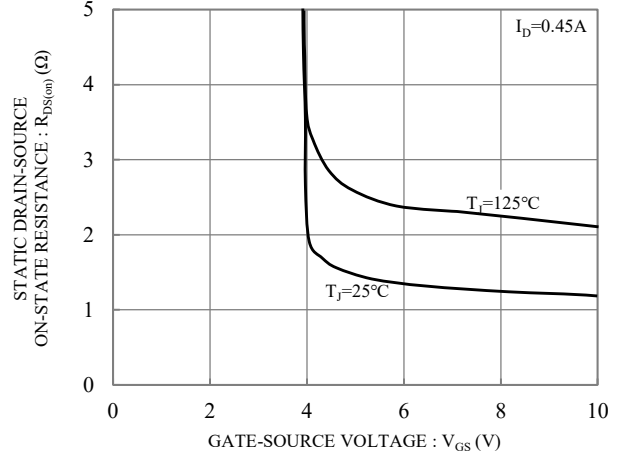


Fig.4 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

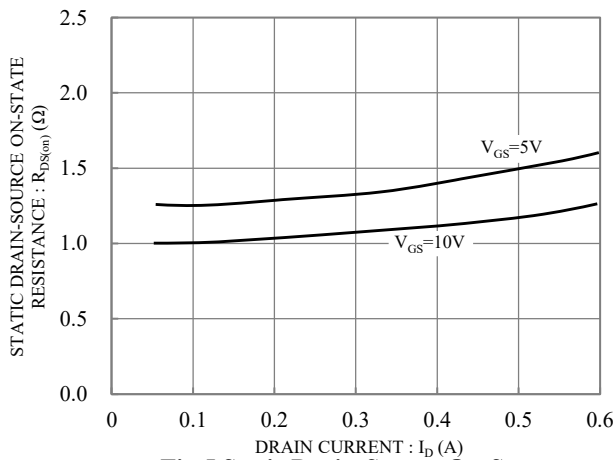


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

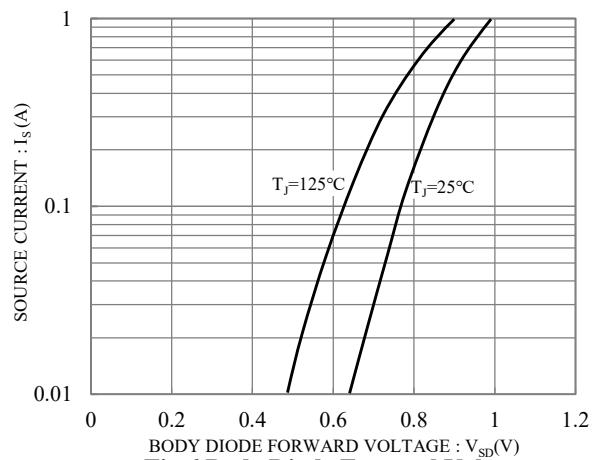


Fig.6 Body Diode Forward Voltage vs. Source Current



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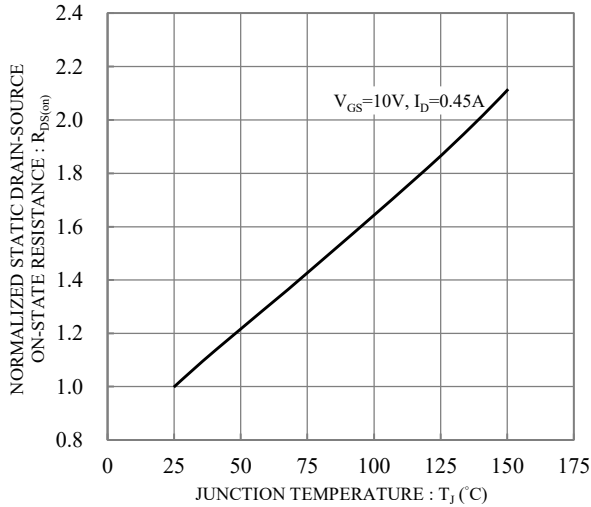


Fig.7 Drain-Source On-State Resistance vs. Junction Temperature

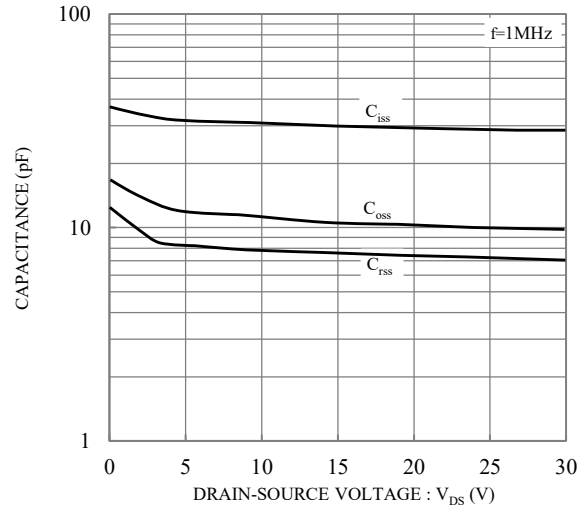


Fig.8 Capacitance vs. Drain-Source Voltage

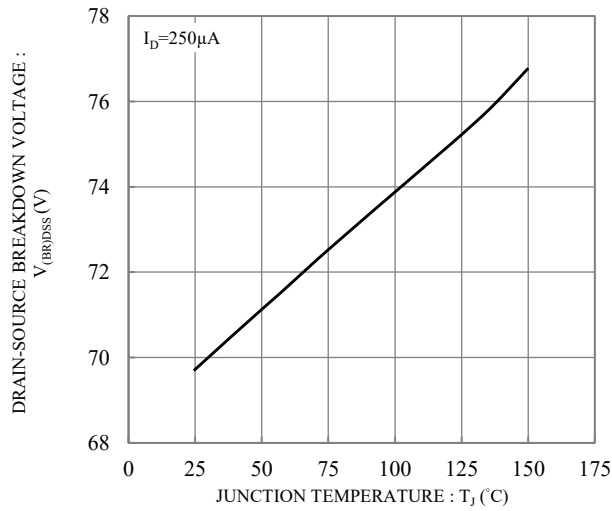


Fig.9 Breakdown Voltage vs. Junction Temperature

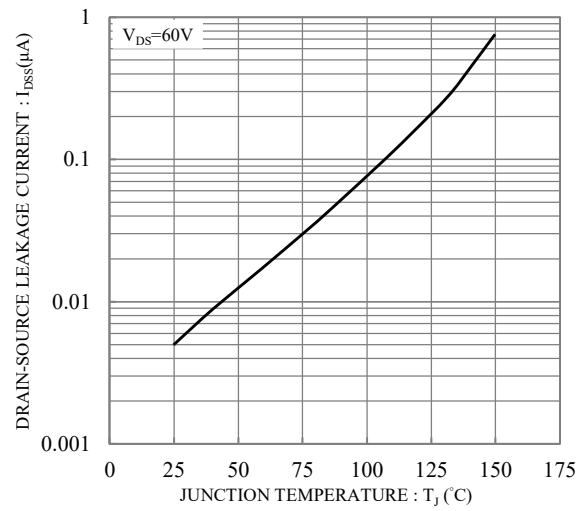


Fig.10 Drain-Source Leakage Current vs. Junction Temperature

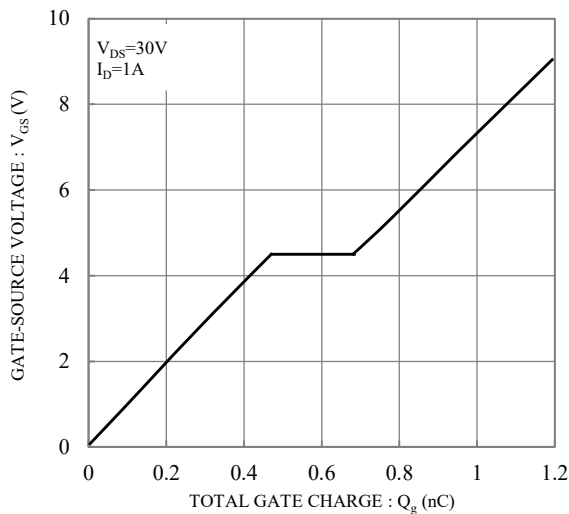


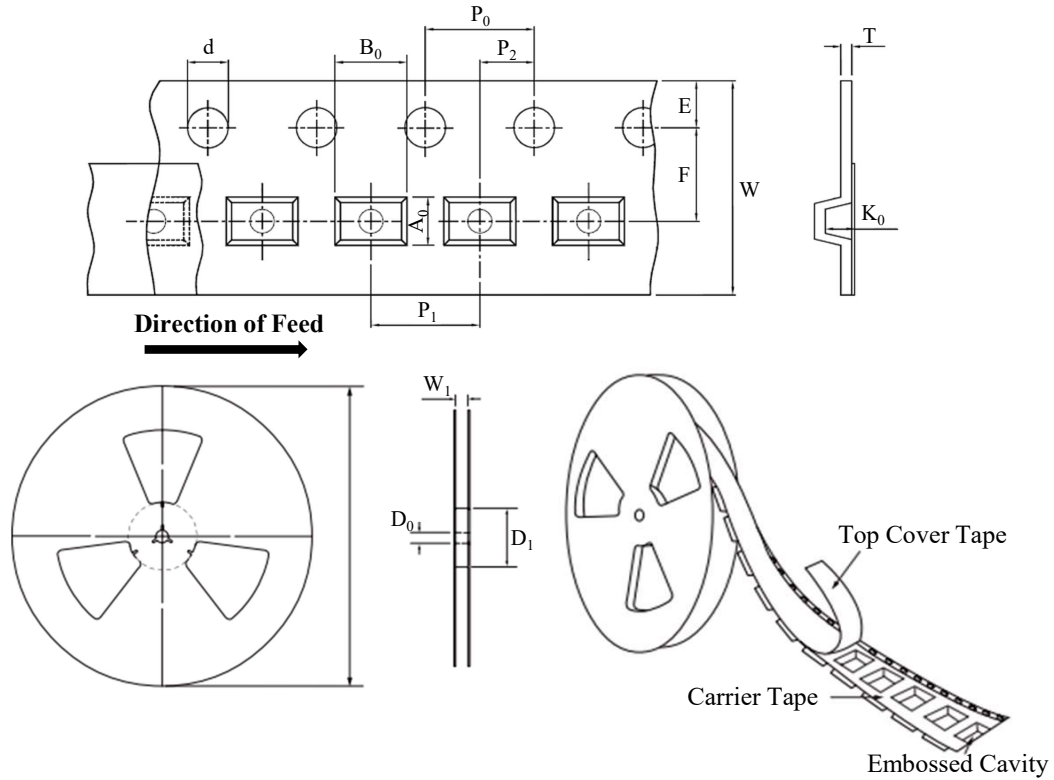
Fig.11 Gate Charge Characteristics



MMBT7002KLPH

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TAPE & REEL SPECIFICATION



Item	Symbol	DFN1006-3
Carrier width	A_0	0.85 ± 0.10
Carrier length	B_0	1.25 ± 0.10
Carrier depth	K_0	0.60 ± 0.10
Sprocket hole	d	1.50 ± 0.10
Reel outside diameter	D	178.00 ± 2.00
Feed hole width	D_0	13.00 ± 0.50
Reel inner diameter	D_1	MIN. 54.00
Sprocket hole position	E	1.75 ± 0.10
Punch hole position	F	3.50 ± 0.10
Sprocket hole pitch	P_0	4.00 ± 0.10
Punch hole pitch	P_1	2.00 ± 0.10
Embossment center	P_2	2.00 ± 0.10
Overall tape thickness	T	MAX. 0.60
Tape width	W	8.00 ± 0.30
Reel width	W_1	8.40 ± 1.50

ORDER INFORMATION

Package	Reel Size	Quantity
DFN1006-3	7"	10,000

MARKING CODE

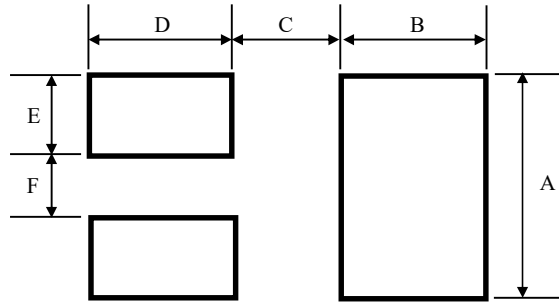
Part Number	Marking Code
MMBT7002KLPH	ML



MMBT7002KLPH

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SUGGESTED SOLDER PAD LAYOUT



Unit : mm

PACKAGE	A	B	C	D	E	F
DFN1006-3	0.70	0.40	0.30	0.40	0.25	0.20