

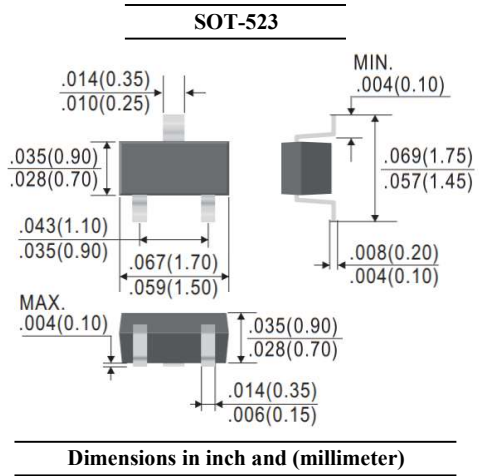
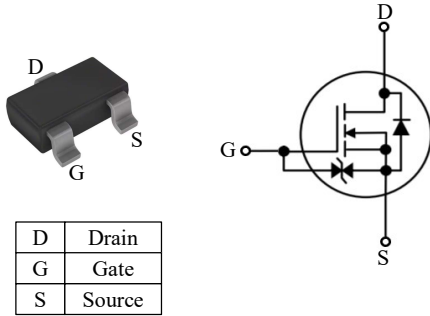


# SM5404KWTH

## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- ESD Protection HBM $\geq$ 2kV
- Suffix "H" indicates Halogen-free parts, ex. SM5404KWTH



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Drain Current	$I_D$	0.5	A
Pulsed Drain Current (Note 1)	$I_{DM}$	3	A
Power Dissipation (Note 2)	$t \leq 10\text{s}$	0.38	W
	Steady State	0.28	
Thermal Resistance from Junction to Ambient (Note 2)	$t \leq 10\text{s}$	330	$^\circ\text{C/W}$
	Steady State	450	
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  $T_{J(\text{MAX})}=150^\circ\text{C}$ .
2. Device mounted on FR-4 substrate PC board, with minimum recommended pad layout.



# SM5404KWTB

## N-Channel Enhancement Mode Field Effect Transistor

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

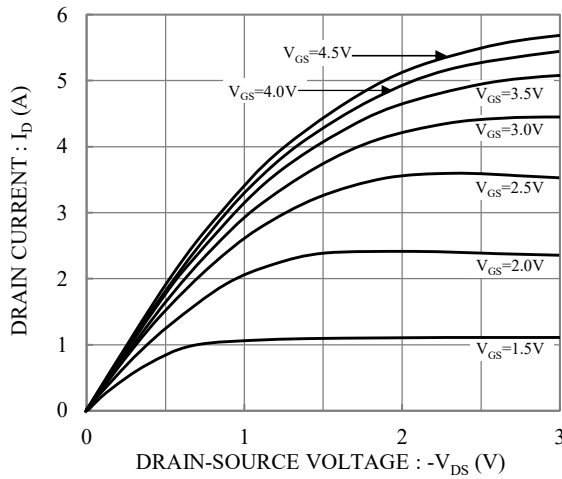
Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain Source Breakdown Voltage	$I_D=250\mu\text{A}$	$V_{DSS}$	20	-	-	V
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu\text{A}$	$V_{GS(th)}$	0.4	-	1.0	V
Zero Gate Voltage Drain Current	$V_{DS}=20\text{V}$	$I_{DSS}$	-	-	1	$\mu\text{A}$
Gate-Body Leakage Current	$V_{GS}=\pm 4.5\text{V}$	$I_{GSS}$	-	-	$\pm 1$	$\mu\text{A}$
	$V_{GS}=\pm 8\text{V}$		-	-	$\pm 10$	
Drain-Source On-State Resistance	$V_{GS}=4.5\text{V}, I_D=0.5\text{A}$	$R_{DS(on)}$	-	-	550	m $\Omega$
	$V_{GS}=2.5\text{V}, I_D=0.5\text{A}$		-	-	680	
	$V_{GS}=1.8\text{V}, I_D=0.3\text{A}$		-	-	800	
<b>Dynamic</b>						
Forward Transfer Admittance	$V_{DS}=10\text{V}, I_D=0.4\text{A}$	$g_{fs}$	-	1.4	-	S
Total Gate Charge	$V_{DS}=10\text{V}, I_D=1\text{A}, V_{GS}=2.5\text{V}$	$Q_g$	-	0.65	-	nC
			-	1.10	-	
Gate-Source Charge	$V_{DS}=10\text{V}, I_D=1\text{A}, V_{GS}=4.5\text{V}$	$Q_{gs}$	-	0.30	-	
Gate-Drain Charge		$Q_{gd}$	-	0.20	-	
Input Capacitance	$V_{DS}=10\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$	$C_{iss}$	-	72	-	pF
Output Capacitance		$C_{oss}$	-	14	-	
Reverse Transfer Capacitance		$C_{rss}$	-	12	-	
Turn-On Delay Time	$V_{GS}=4.5\text{V}, V_{DS}=10\text{V}, I_D=0.5\text{A}, R_g=10\Omega$	$t_{d(on)}$	-	12	-	ns
Turn-On Rise Time		$t_r$	-	6	-	
Turn-Off Delay Time		$t_{d(off)}$	-	13	-	
Turn-Off Fall Time		$t_f$	-	10	-	
<b>Drain-Source Body Diode</b>						
Drain-Source Diode Forward Voltage	$I_S=0.1\text{A}$	$V_{SD}$	-	-	1	V
Diode Continuous Source Current	-	$I_S$	-	-	0.5	A
Reverse Recovery Time	$I_S=1\text{A}, di/dt=100\text{A}/\mu\text{s}$	$t_{rr}$	-	5.2	-	ns
Reverse Recovery Charge		$Q_{rr}$	-	1.2	-	nC



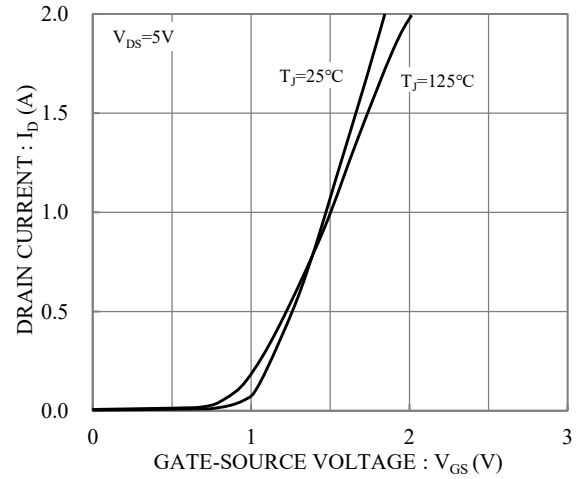
# SM5404KWTH

## N-Channel Enhancement Mode Field Effect Transistor

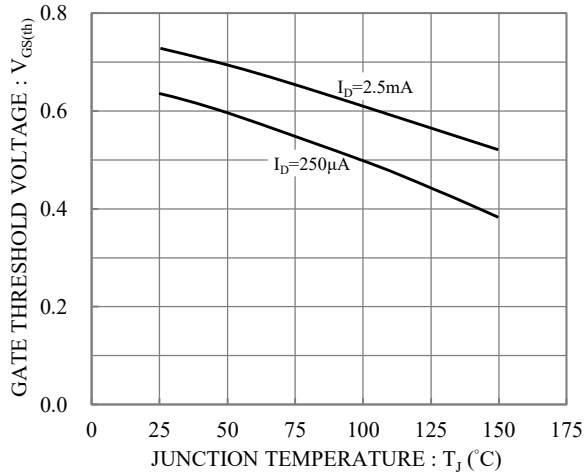
### RATINGS AND CHARACTERISTIC CURVES



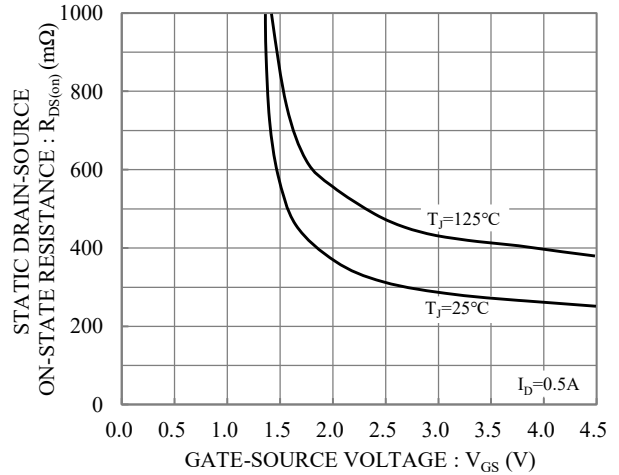
**Fig.1 Typical Output Characteristics**



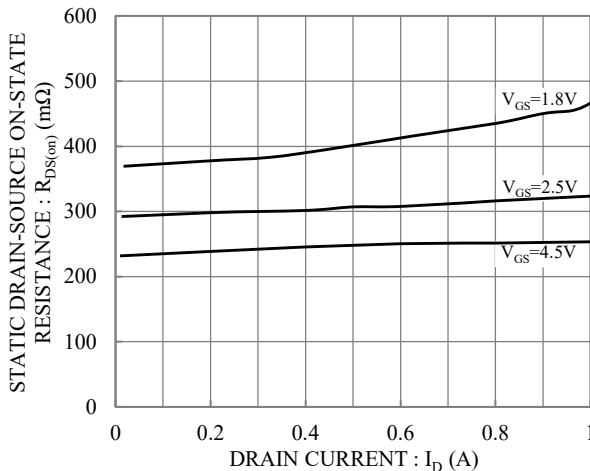
**Fig.2 Typical Transfer Characteristics**



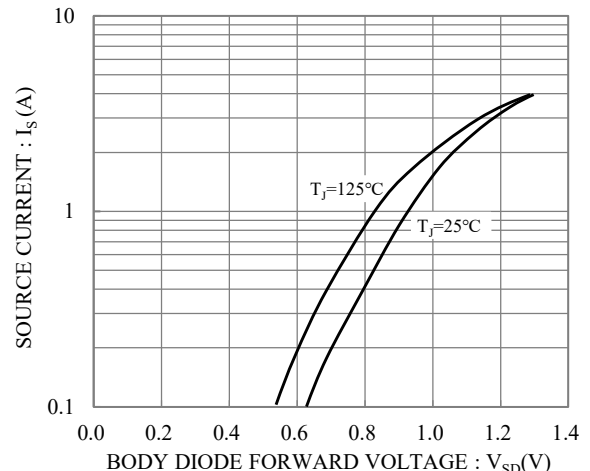
**Fig.3 Gate Threshold Voltage vs. Junction Temperature**



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



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

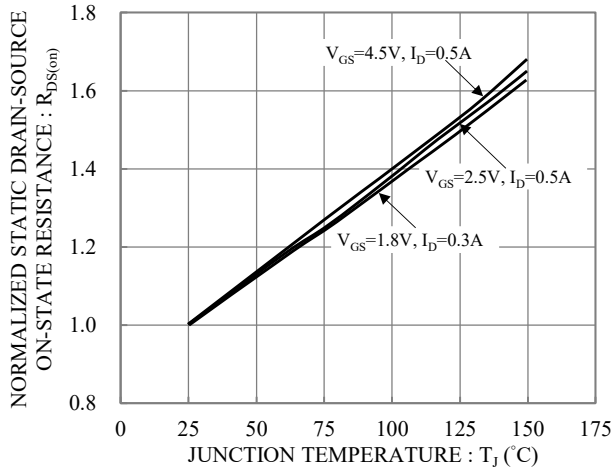


**Fig.6 Body Diode Forward Voltage vs. Source Current**

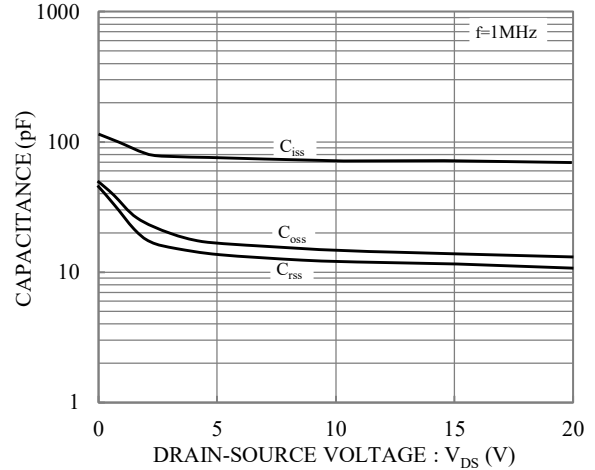


# SM5404KWTH

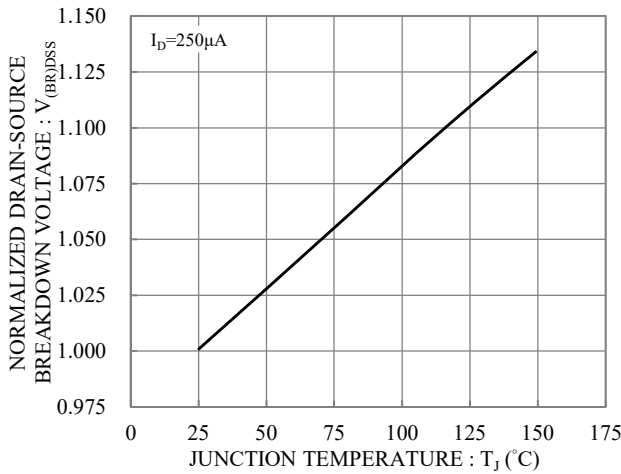
## N-Channel Enhancement Mode Field Effect Transistor



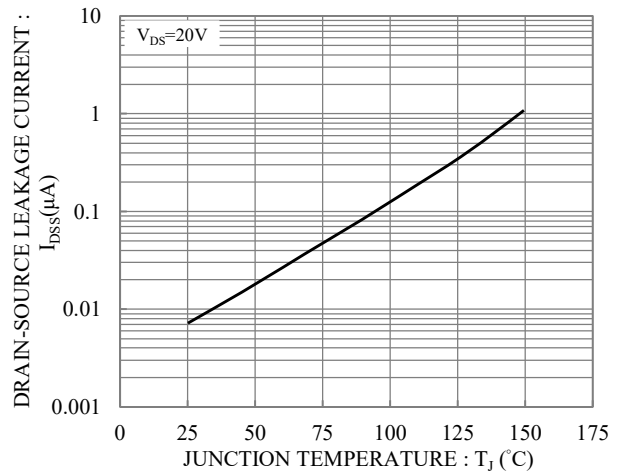
**Fig.7 Drain-Source On-State Resistance vs Junction Temperature**



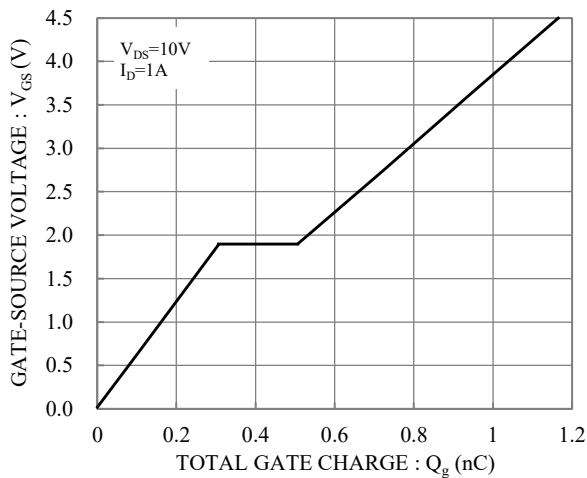
**Fig.8 Capacitance vs Drain-Source Voltage**



**Fig.9 Breakdown Voltage vs Junction Temperature**



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



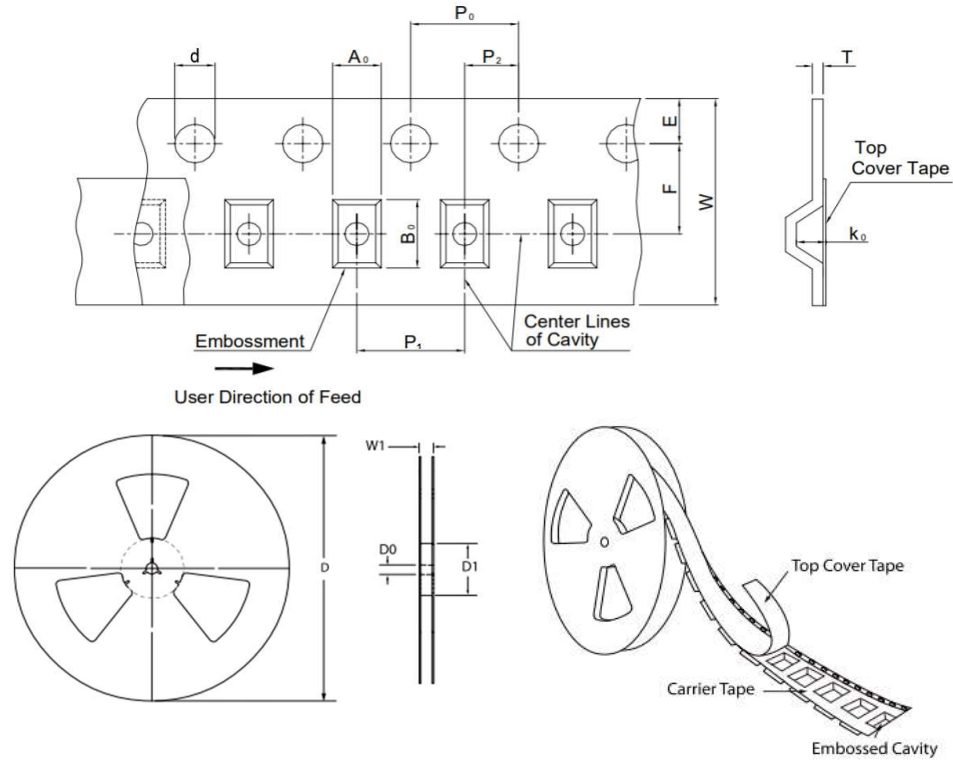
**Fig.11 Gate Charge**



# SM5404KWTH

## N-Channel Enhancement Mode Field Effect Transistor

### TAPE & REEL SPECIFICATION



Item	Symbol	SOT-523
Carrier width	A <sub>0</sub>	1.95 ± 0.10
Carrier length	B <sub>0</sub>	1.90 ± 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	W1	MAX. 14.50

### ORDER INFORMATION

Package	Reel Size	Quantity
SOT-523	7"	4,000

### MARKING CODE

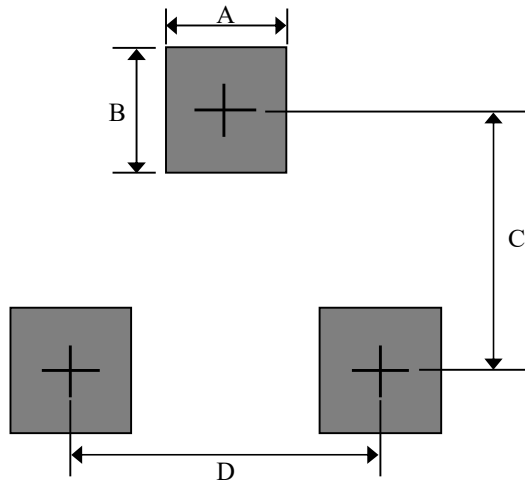
Part Number	Marking Code
SM5404KWTH	MJ



# SM5404KWH

*N-Channel Enhancement Mode Field Effect Transistor*

## **SUGGESTED SOLDER PAD LAYOUT**



Unit : mm

PACKAGE	A	B	C	D
SOT-523	0.70	0.70	1.30	1.00