FMS2305A

List

FMS2305A

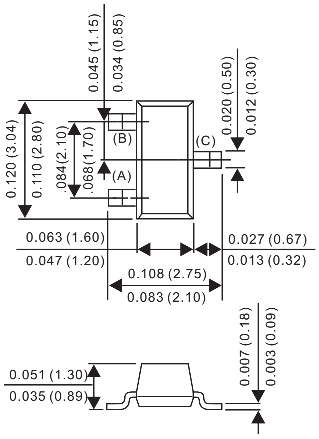
30V P-Channel Enhancement
Mode Power MOSFET

Features

- Super high dense cell design for low $R_{DS(ON)}$
  $R_{DS(ON)}$ <60mΩ@V_{GS} =-10V.
- Rugged and reliable.
- Capable of 2.5V gate drive.
- Simple drive requirement.
- In compliance with EU RoHS 2002/95/EC directives.
- Suffix "-H" indicates Halogen-free part, ex.FMS2305A-H.

Package outline

SOT-23



Dimensions in inches and (millimeters)

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per
  MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

Maximum ratings (AT T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Drain-source voltage		V_{DSS}			-30	V
Drain current-continue (T_A = 25°C)		I_D			-3.2	A
(T_A = 70°C)					-2.6	
-pulsed		I_{DM}			-10	
Gate- source voltage-continue		V_{GS}			±12	V
Total power dissipation (Derate above 25°C)		P_D			1.38	W
Junction to ambient thermal resistance		$R_{\theta JA}$			90	°C/W
Operation junction temperature		T_J	-55		+150	°C
Storage temperature		T_{STG}	-65		+175	°C

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Electrical characteristics (At T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
OFF CHARACTERISTICS						
Drain-source breakdown voltage	V_{GS} = 0V, I_D= -250uA	BV_{DSS}	-30			V
Zero gate voltage drain current	V_{DS} = -30V, V_{GS} = 0V, T_J = 25°C	I_{DSS}			-1.0	μA
	V_{DS} = -24V, V_{GS} = 0V, T_J = 70°C				-25	
Gate-body leakage current-forward	V_{GS} = 12V, V_{DS}=0	I_{GSSF}			100	nA
Gate-body leakage current-reverse	V_{GS} = -12V, V_{DS}=0	I_{GSSR}			-100	nA
ON CHARACTERISTICS (Note 1)						
Gate threshold voltage	V_{DS} = V_{GS}, I_D = -250μA	$V_{GS(th)}$	-0.5			V
Static drain-source on-resistance	V_{GS} = -10V, I_D = -3.2A	$R_{DS(ON)}$			60	mΩ
	V_{GS} = -4.5V, I_D = -3.0A				80	
	V_{GS} = -2.5V, I_D = -2.0A				150	
	V_{GS} = -1.8V, I_D= -1.0A				250	
Reverse recovery time, Note 1	V_{GS} =0 , I_S = -1.2A, di/dt = 100A/uS	T_{rr}		24		nS
Reverse recovery charge, Note 1	V_{GS} =0 , I_S = -3.2A, di/dt = 100A/uS	Q_{rr}		19		nC
Forward transconductance, Note 1	V_{DS} =-5V, I_D = -3A*	g_{FS}		9.0		sec
Forward on voltage, Note 1	V_{GS} =0V, I_S = -1.2A, T_J =25°C,	V_{SD}			-1.2	V
DYNAMIC CHARACTERISTICS						
Intput capacitance	V_{DS} = -25V, V_{GS} = 0V, f=1.0MHz	C_{ISS}		735	1325	pF
Output capacitance		C_{OSS}		100		
Reverse transfer capacitance		C_{RSS}		80		
Total gate charge	V_{DS} = -24V, I_D = -3.2A V_{GS}=-4.5V	Q_G		10		nC
Gate-source charge		Q_{GS}		1.8		
Gate-drain charge		Q_{GD}		3.6		
Turn-On Delay Time	V_{DS} = -15V,R_D=4.6Ω, R_G=3.3Ω I_D=-3.2A, V_{GS}=-10V	$T_{D(ON)}$		7.0		ns
		T_R		15		
Turn-Off Delay Time		$T_{D(OFF)}$		21		
		T_F		15		

Note 1. Pulse duration >= 300μs, duty cycle 2.0%
2. Pulse width limited by Max. junction temperature
3. Surface mounted on 1 inch square copper pad of FR4 board; 270°C/W when mounted on min. copper pad.

Rating and characteristic curves (FMS2305A)

FIG.1 TYPICAL OUTPUT CHARACTERISTIC

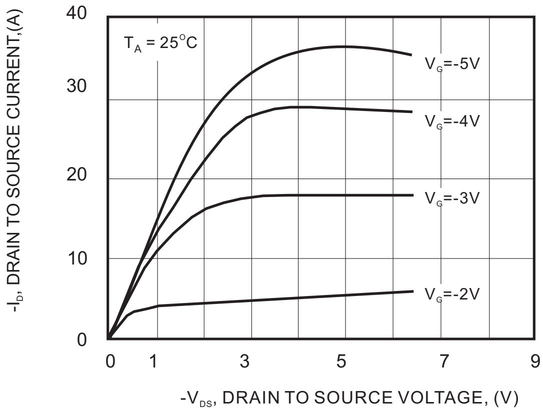


FIG.2 NORMALIZD ON-RESISTANCE

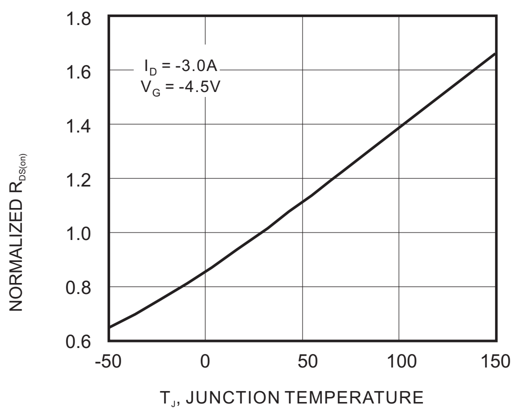


FIG.3 ON RESISTANCE VS GATE VOLTAGE

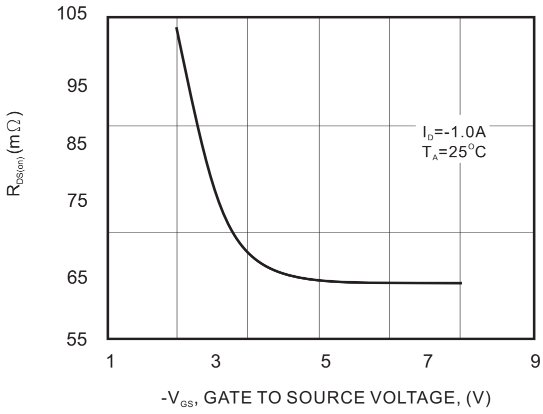


FIG.4 FORWARD CHARACTERISTICS OF REVERSE DIODE

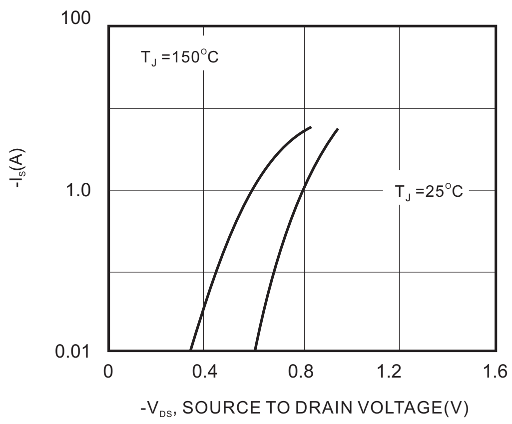
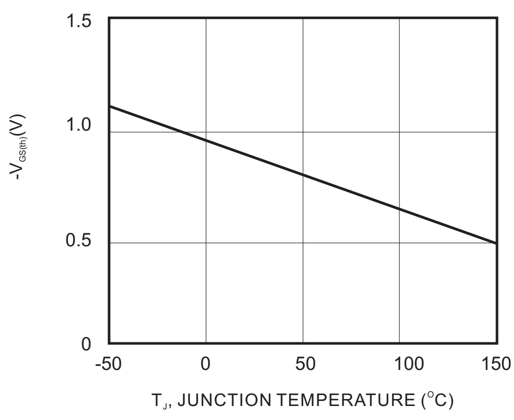


FIG.5 GATE THRESHOLD VOLTAGE VS JUNCTION TEMPERATURE



Rating and characteristic curves (FMS2305A)

FIG.6 GATE CHARGE WAVEFORM

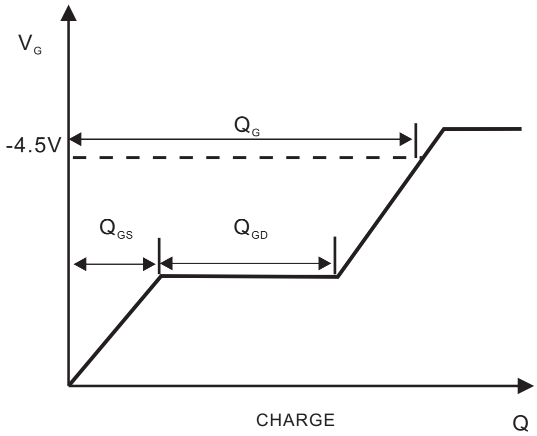


FIG.7 GATE CHARGE

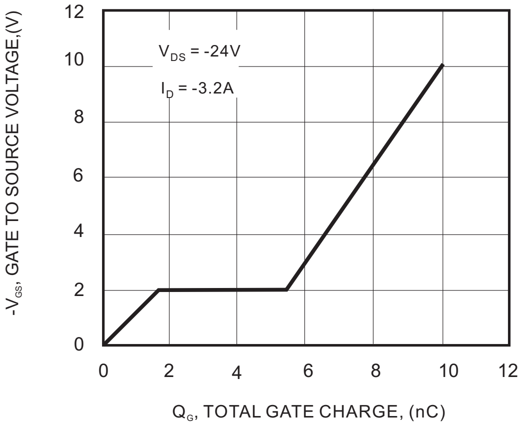


FIG.8 TYPICAL CAPACITANCE CHARACTERISTICS

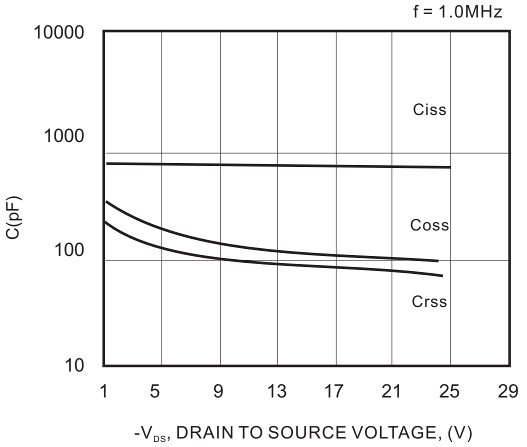


FIG.9 MAXIMUM SAFE OPERATION AREA

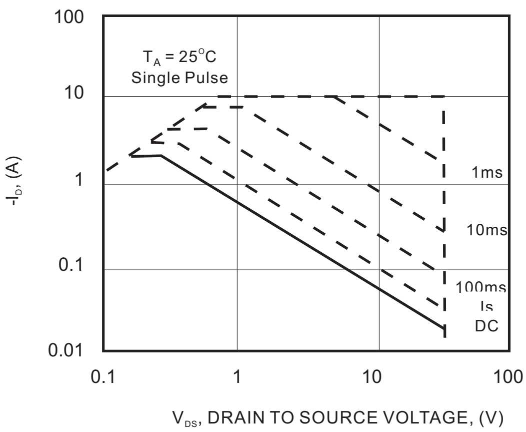


FIG.10 EFFECTIVE TRANSIENT THERMAL IMPEDANCE

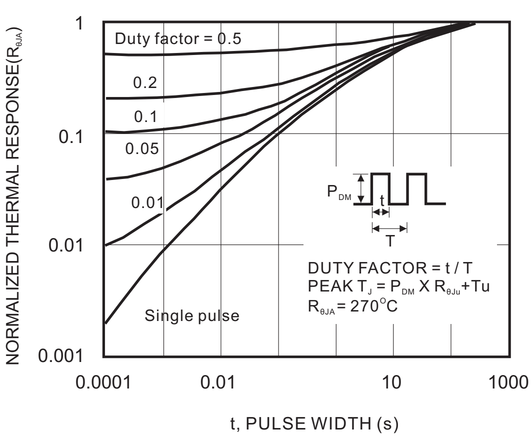
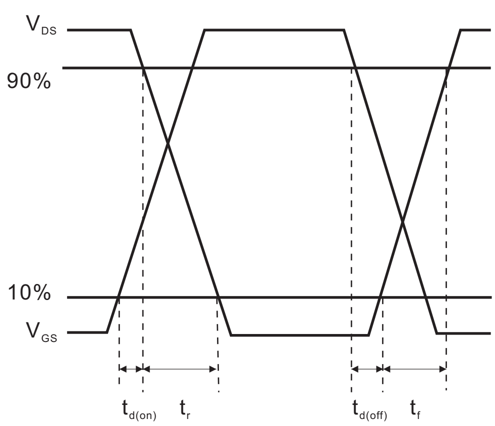


FIG.11 SWITCHING TIME CIRCUIT



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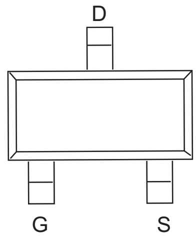
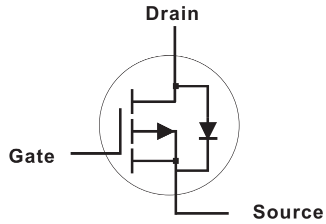
Pinning information

Pin	Simplified outline	Symbol
PinD Drain PinG Gate PinS Source		

Marking

Type number	Marking code
FMS2305A	P05 Σ Note 1

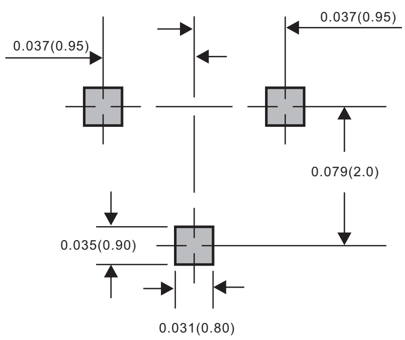
Note 1: Σ=Date code

Year \ Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Odd	1	2	3	4	5	6	7	8	9	T	V	C
Even	E	F	H	J	K	L	N	P	U	X	Y	Z

Example:

Suggested solder pad layout

SOT-23



Dimensions in inches and (millimeters)

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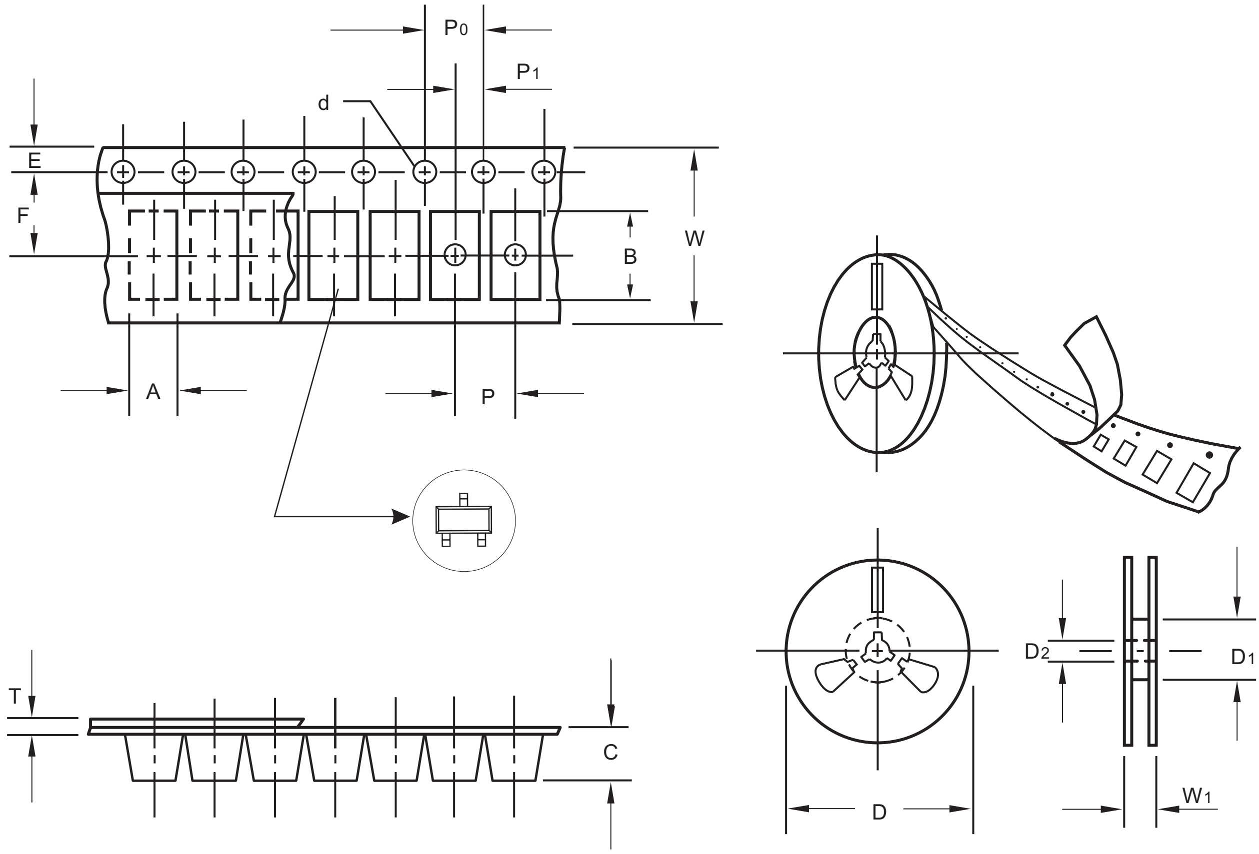
Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	55.00
Feed hole diameter	D_2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	1.0	12.0

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

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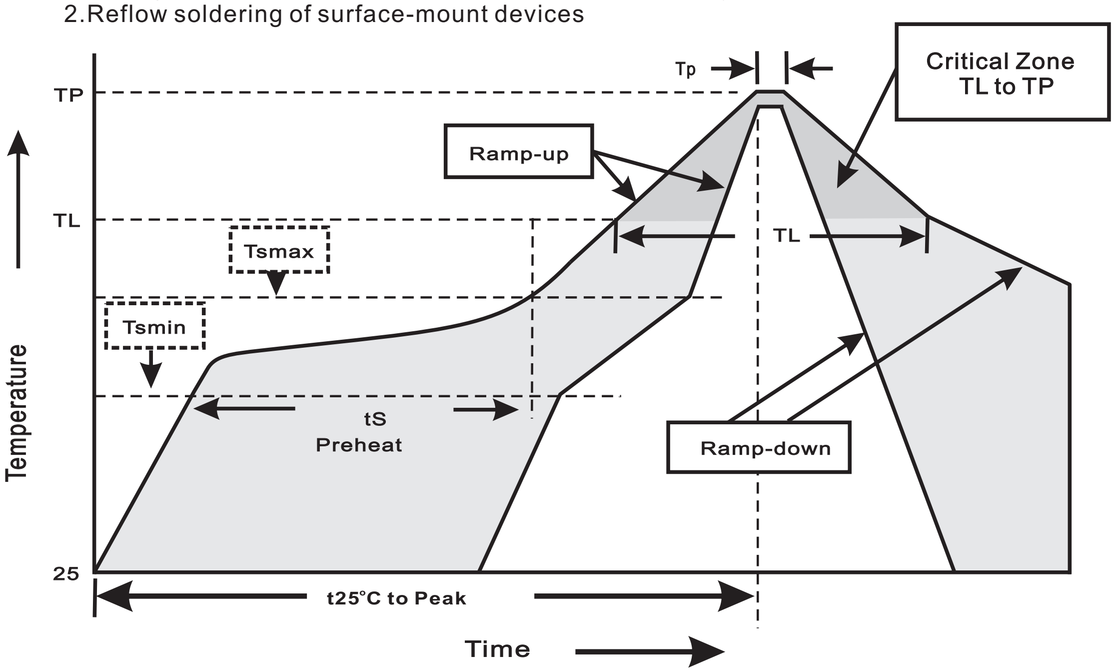
Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000	11.6

Suggested thermal profiles for soldering processes

1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	<3°C/sec
Preheat -Temperature Min(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	150°C 200°C 60~120sec
Tsmax to T_L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T_L) -Time(t_L)	217°C 60~260sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

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High reliability test capabilities

Item Test	Conditions	Reference
1. Solder Resistance	at 260±5°C for 10±2sec. immerse body into solder 1/16"±1/32"	MIL-STD-750D METHOD-2031
2. Solderability	at 245±5°C for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	V_{DS}=0.8 X BV_{DSS}, V_{GS}=0V at T_J=150°C for 168 hrs.	MIL-STD-750D METHOD-1026
4. Operation Life Test	Continuous operation at max rated T_A=25°C, P_C=$P_{C(max)}$ for 500hrs.	MIL-STD-750D METHOD-1027
5. Pressure Cooker	15P_{SIG} at T_A=121°C for 4 hrs.	JESD22-A102
6. Temperature Cycling	-55°C to +125°C dwelled for 30 min. and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
7. Thermal Shock	0°C for 5 min. rise to 100°C for 5 min. total 10 cycles.	MIL-STD-750D METHOD-1056
8. Humidity	at T_A=85°C, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1038
9. High Temperature Storage Life	at 175°C for 1000 hrs.	MIL-STD-750D METHOD-1031