FMOS2305F

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-4.2A -20V P-Channel Enhancement Mode Power MOSFET

Features

- $-V_{DS}$=20V, $-I_D$=4.2A.
- $R_{DS(on)}$≤ 53 mΩ @$-V_{GS}$=10V, $-I_D$=4.5A.
- $R_{DS(on)}$≤ 65 mΩ @$-V_{GS}$=4.5V,$-I_D$=4.2A.
- $R_{DS(on)}$≤ 100 mΩ @$-V_{GS}$=2.5V,$-I_D$=2.0A.
- Low on-resistance provides higher efficiency and extends battery life.
- Fast switching speed.
- Excellent CdV/dt effect decline.
- High performance trench technology.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMOS2305F-H.

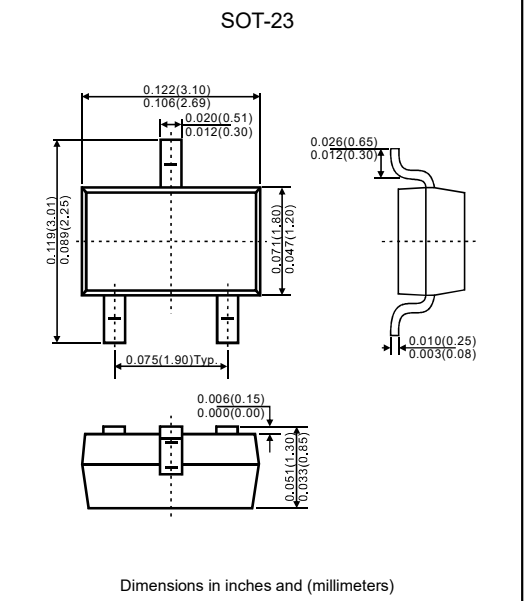
Applications

- Power management in portable and battery-powered products.
- Computers, printers, and PCMCIA cards.
- Cellular and cordless telephones...etc.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.

Package outline



Dimensions in inches and (millimeters)

Maximum Ratings (At T_A=25°C Unless otherwise noted)

Parameter		Symbol	Rating	Unit
Drain source voltage		$-V_{DS}$	20	V
Gate source voltage		V_{GS}	±12	V
Drain current continuous (Note 1)	(T_A=25°C)	$-I_D$	4.2	A
	(T_A=70°C)		3.4	
Pulsed drain current (Note 2)		$-I_{DM}$	10	A
Power dissipation (Note 1)	(T_A=25°C)	P_D	1.38	W
Linear derating factor			0.01	W/°C
Thermal resistance, junction to ambient (Note 1)		$R_{\theta JA}$	90	°C/W
Operating junction temperature		T_J	+150	°C
Storage temperature range		T_{STG}	-55 to +150	°C

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Electrical characteristics (At T_J=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static parameters						
Drain-source breakdown voltage	$-BV_{DSS}$	$-I_D$=250μA, V_{GS}=0V	20			V
Drain-source leakage current	$-I_{DSS}$	$-V_{DS}$=20V , V_{GS}=0V , T_J=25°C			1	μA
		$-V_{DS}$=16V , V_{GS}=0V , T_J=55°C			10	
Gate-source leakage current	I_{GSS}	V_{GS}=±12V, V_{DS}=0V			±100	nA
On characteristics						
Gate threshold voltage	$-V_{GS(TH)}$	V_{DS}=V_{GS}, $-I_D$=250μA	0.5		1.2	V
Static drain-source on-state resistance (note 3)	$R_{DS(ON)}$	$-V_{GS}$=10V, $-I_D$=4.5A			53	mΩ
		$-V_{GS}$=4.5V, $-I_D$=4.2A			65	
		$-V_{GS}$=2.5V, $-I_D$=2.0A			100	
Forward transconductance (note 3)	g_{FS}	$-V_{DS}$=5V, $-I_D$=2.8A		9		S
Dynamic parameters (note 4)						
Input capacitance	C_{iss}	V_{GS}=0V, $-V_{DS}$=15V, f=1.0MHz		740		pF
Out capacitance	C_{oss}			167		
Reverse transfer capacitance	C_{rss}			126		
Switching parameters (note 4)						
Total gate charge	Q_g	$-V_{GS}$=4.5V,$-V_{DS}$=16V,$-I_D$=4.2A		10.6		nC
Gate to source charge	Q_{gs}			2.32		
Gate to drain charge	Q_{gd}			3.68		
Turn-on delay time	$t_{d(on)}$	$-V_{DS}$=15V, $-V_{GS}$=10V, R_G=6Ω, R_D=3.6Ω, $-I_D$=4.2A		5.9		ns
Rise time	t_r			3.6		
Turn-off delay time	$t_{d(off)}$			32.4		
Fall time	t_f			2.6		
Source-drain diode ratings and characteristics						
Drain-source diode forward voltage	$-V_{SD}$	$-I_S$=1.2A, V_{GS}=0V			1.2	V
Reverse recovery time	T_{rr}	$-I_S$=4.2A, V_{GS}=0V, dI/dt=100A/μs		27.7		nS
Reverse recovery charge	Q_{rr}			22		nC

Note: 1.Surface mounted on 1"x1" FR4 board.
2. Pulse width limited by maximum junction temperature.
3. Pulse width ≤ 300μs, duty cycle ≤ 2%.
4. Pulse width limited by maximum junction temperature.

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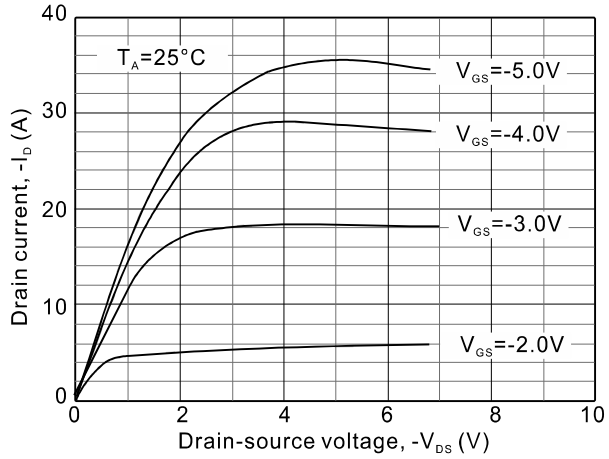
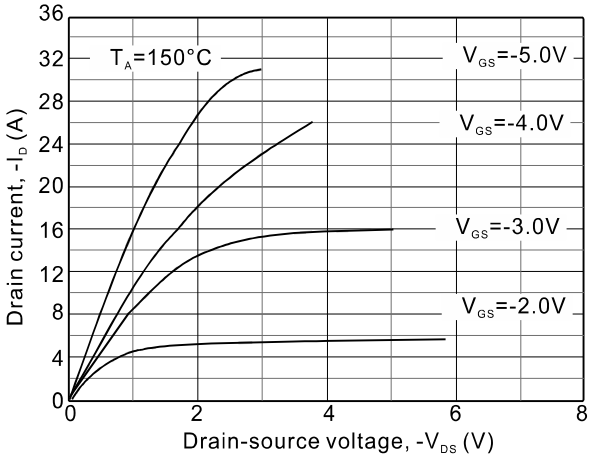
Rating and characteristic curves

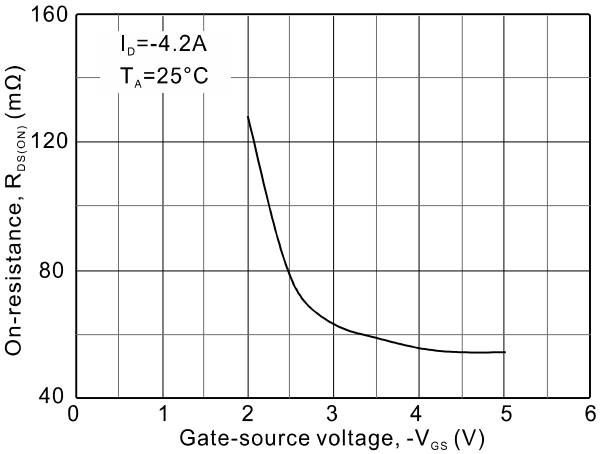
Typical output characteristics



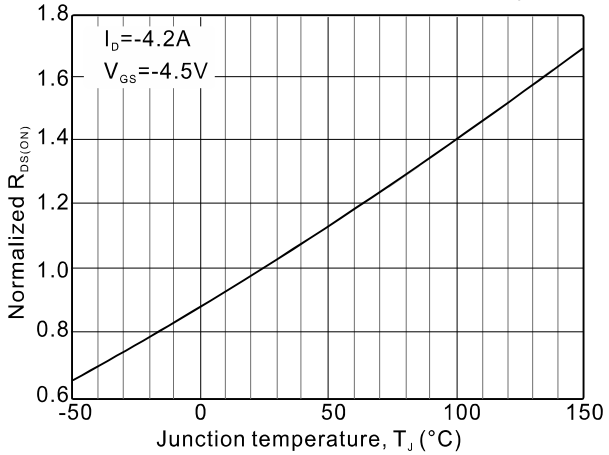
Typical output characteristics



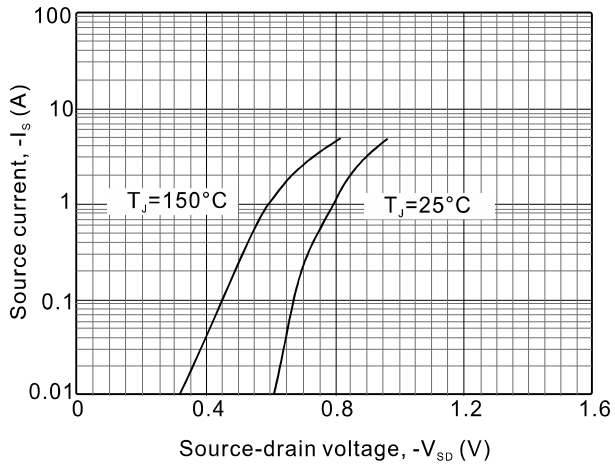
On-resistance vs. Gate-source voltage



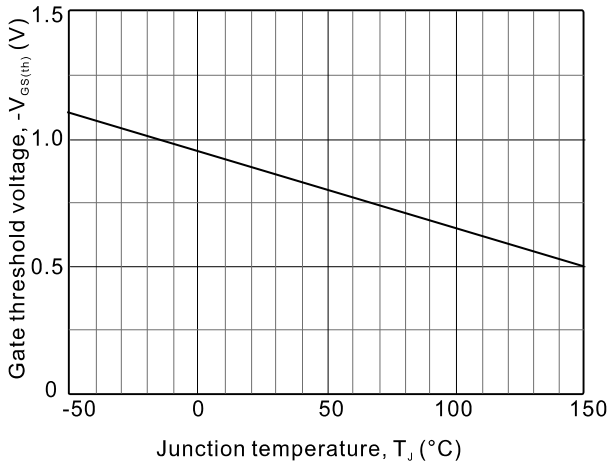
Normalized on-resistance vs. Junction temperature



Forward characteristics of reverse diode



Gate threshold voltage vs. Junction temperature



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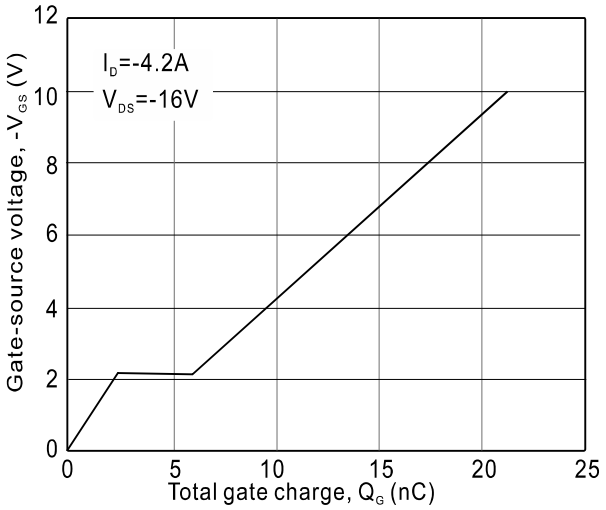
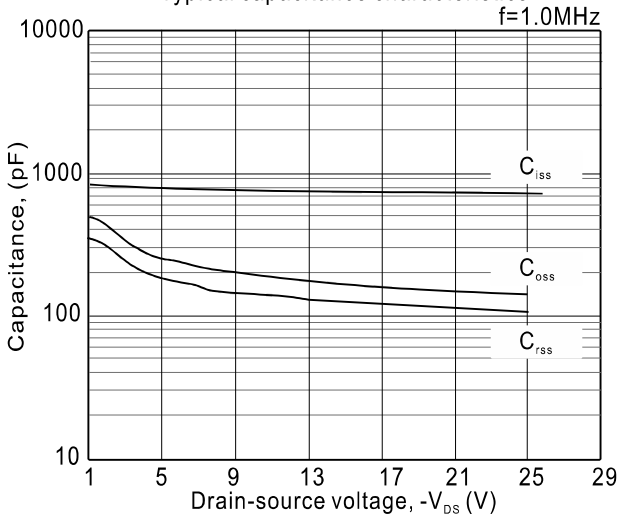
Rating and characteristic curves

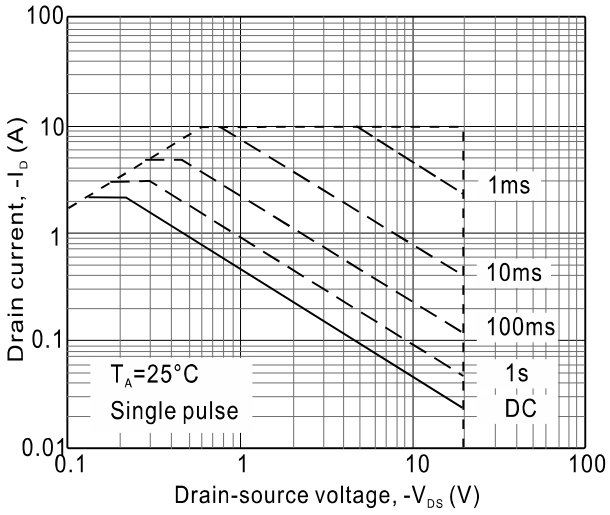
Gate charge characteristics



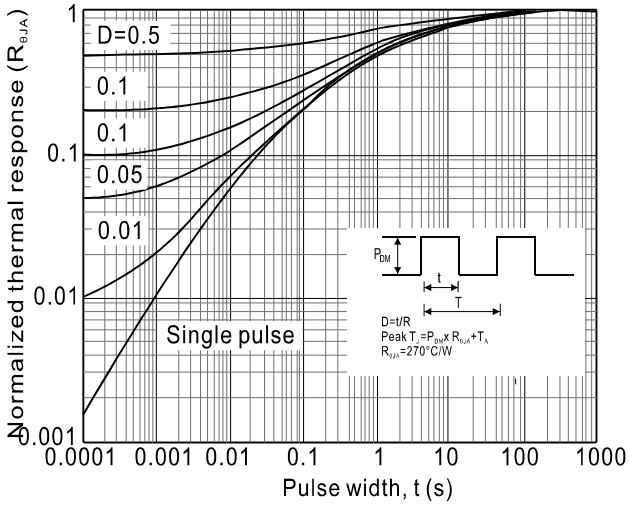
Typical capacitance characteristics



Maximum safe operating area



Effective transient thermal impedance



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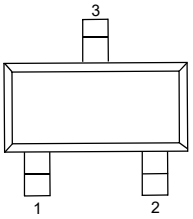
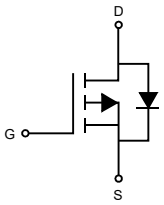
Pinning information

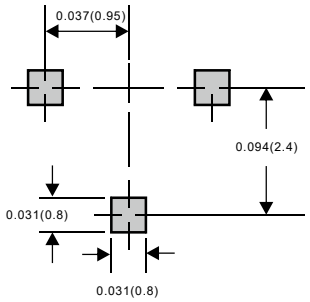
Pin	Simplified outline	Symbol
Pin1 Gate Pin2 Source Pin3 Drain		

Marking

Type Number	Marking code
FMOS2305F	2305

Suggested solder pad layout

SOT-23



Dimensions in inches and (millimeters)

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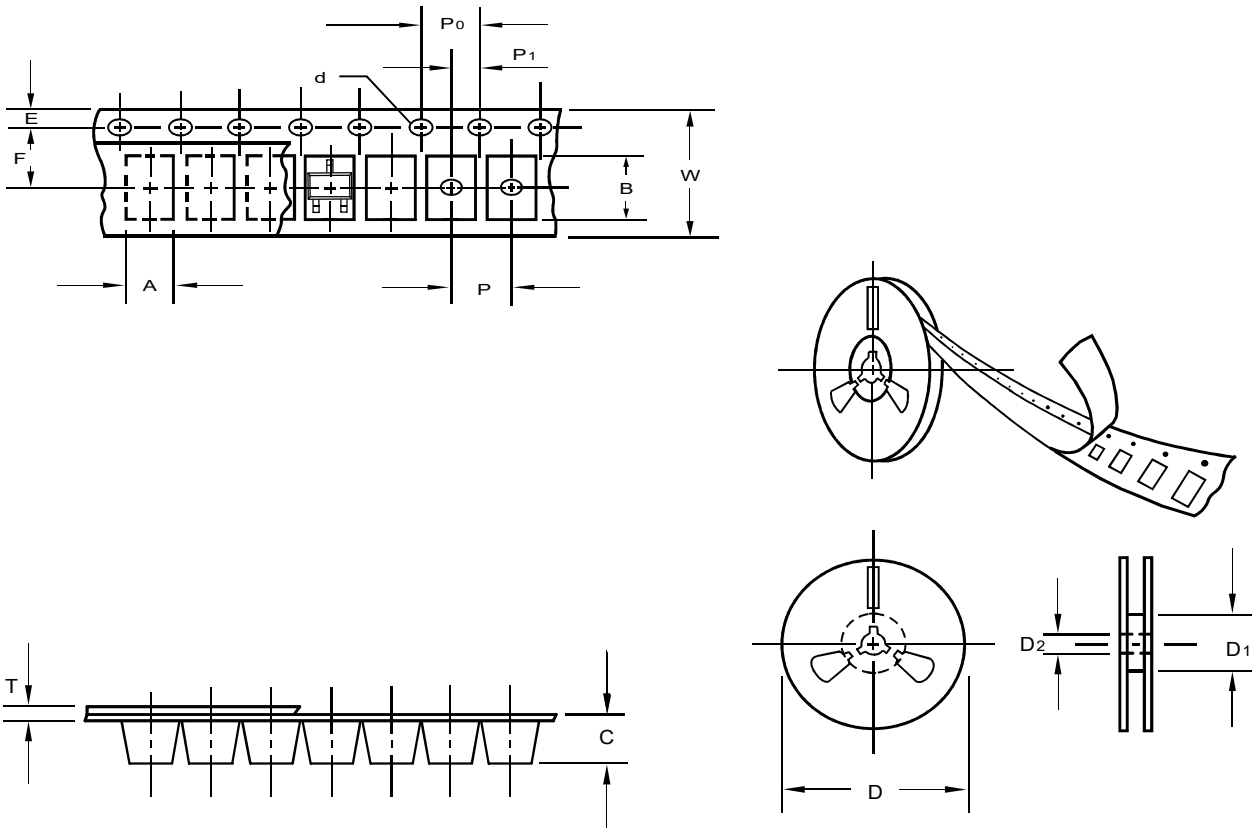
Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	1.0	3.15
Carrier length	B	1.0	3.25
Carrier depth	C	1.0	1.47
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	55.0
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	0.20
Tape width	W	0.3	8.00

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

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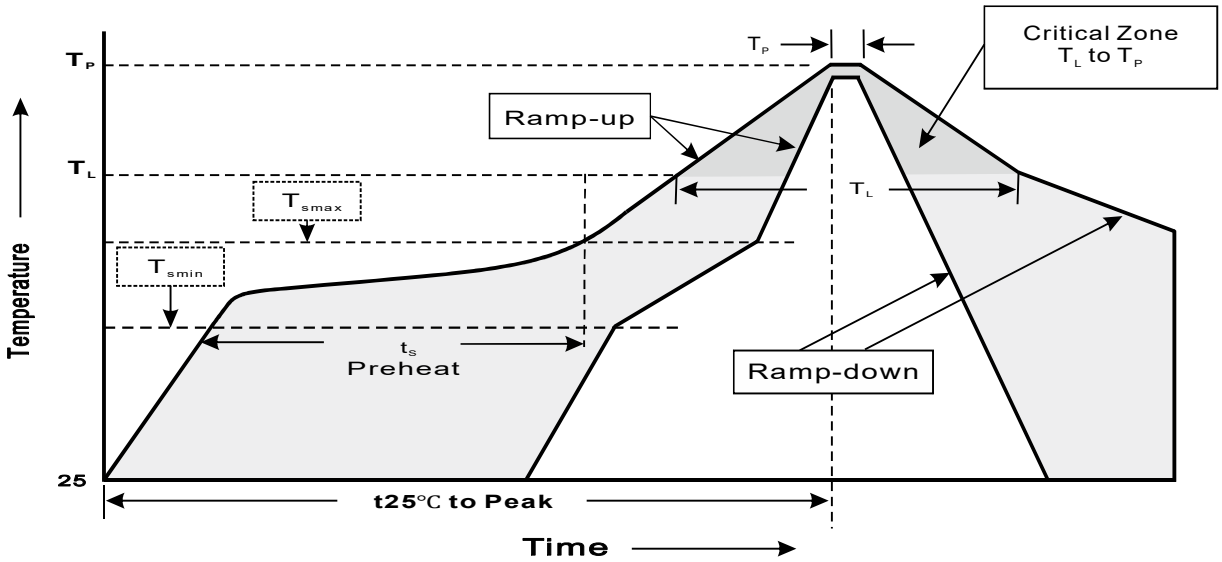
Reel packing

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)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000

Suggested thermal profiles for soldering processes

1.Storage environment: Temperature=5℃~40℃ 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℃/sec
Prehaeat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max) (t_S)	 150℃ 200℃ 60 ~120sec
T_{smax} to T_L -Ramp-up rate	< 3℃/sec
Time maintained above: -Temperature (T_L) -Time(T_L)	 217℃ 60 ~ 260 sec
Peak Temperature(T_P)	255℃ -0/+5℃
Time within 5℃ of actual peak Temperature(T_P)	10 ~ 30sec
Ramp-down rate	< 6℃/sec
Time 25℃ to peak temperature	< 6 minutes