

MJ P-Channel Enhancement Mode Power MOSFET

Description

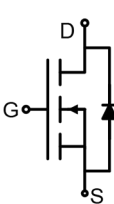
The MJ3420 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a uni-directional or bi-directional load switch.

General Features

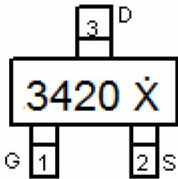
- ◆ $V_{DS}=20V, I_D=6A$
 $R_{DS(ON)}<40m\Omega$ @ $V_{GS}=2.5V$
 $R_{DS(ON)}<33m\Omega$ @ $V_{GS}=4.5V$
- ◆ High Power and current handling capability
- ◆ Surface Mount Package
- ◆ Pb free terminal plating
- ◆ RoHS compliant
- ◆ Halogen free

Application

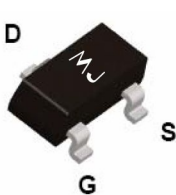
- ◆ Uni-directional Load switch
- ◆ Bi-directional Load switch



Schematic diagram



Marking and pin Assignment



SOT-23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3420 X	MJ3420	SOT-23	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings (Tc =25 °Cunless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	6	A
Pulsed Drain Current ^(Note 1)	I_{DM}	30	A
Maximum Power Dissipation	P_D	1.25	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	100	°C/W
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Electrical Characteristics (T_A =25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V,I _D =250μA	20	22	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =20V,V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{DS} =±12V,V _{GS} =0V	-	-	±100	nA
On Characteristics <small>(Note 3)</small>						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	0.5	0.7	1.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =2.5V, I _D =4.0A	-	21	40	mΩ
		V _{GS} =4.5V, I _D =5.0A	-	18	33	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =5A	-	25	-	S
Dynamic Characteristics <small>(Note 4)</small>						
Input Capacitance	C _{iss}	V _{DS} =10V,V _{GS} =0V, F=1.0MHz	-	424.5	-	PF
Output Capacitance	C _{OSS}		-	59.5	-	PF
Reverse Transfer Capacitance	C _{rss}		-	51.5	-	PF
Switching Characteristics <small>(Note 4)</small>						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V, ,R _L =2Ω V _{GS} =10V,R _{GEN} =3Ω	-	3	-	nS
Turn-on Rise Time	t _r		-	7.5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	20	-	nS
Turn-Off Fall Time	t _f		-	6	-	nS
Total Gate Charge	Q _g	V _{DS} =10V,I _D =5A, V _{GS} =10V	-	12	-	nC
Gate-Source Charge	Q _{gs}		-	1	-	nC
Gate-Drain Charge	Q _{gd}		-	2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <small>(Note 3)</small>	V _{SD}	V _{GS} =0V,I _S =5A	-	-	1.2	V
Diode Forward Current <small>(Note 2)</small>	I _S		-	-	6	A

Notes:

- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ② Surface Mounted on FR4 Board, t ≤ 10 sec.
- ③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- ④ Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

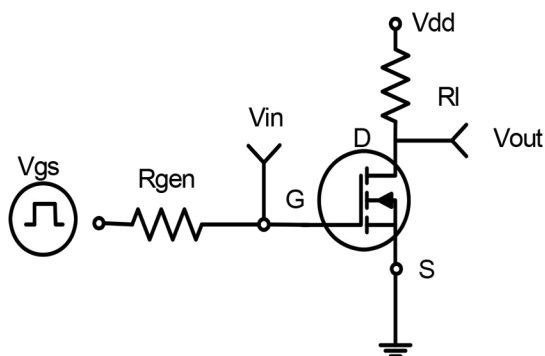


Figure 1 Switching Test Circuit

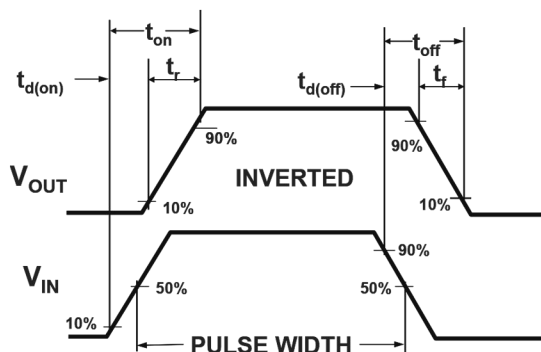


Figure 2 Switching Waveforms

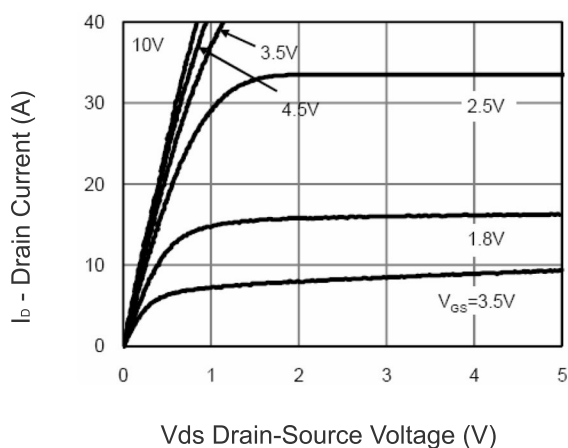


Figure 3 Output Characteristics

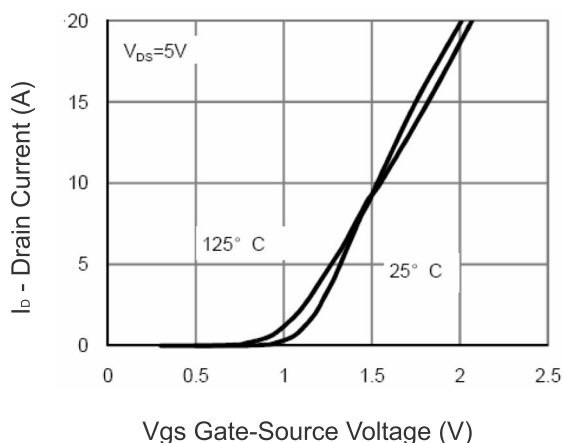


Figure 4 Transfer Characteristics

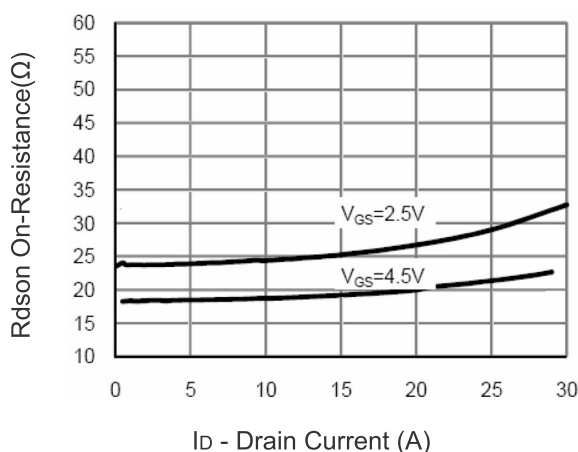


Figure 5 Drain-Source On-Resistance

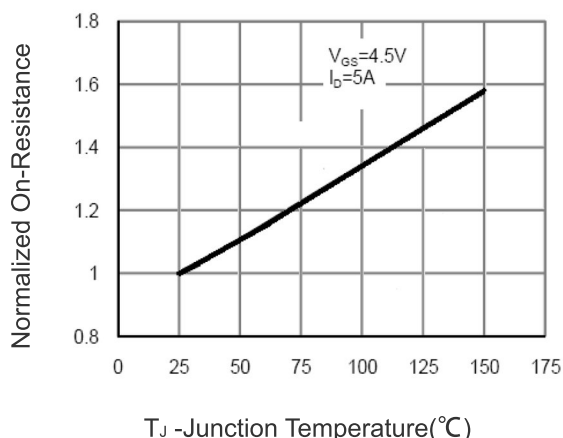
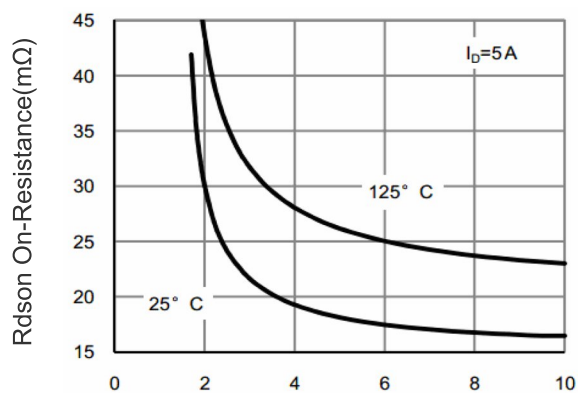
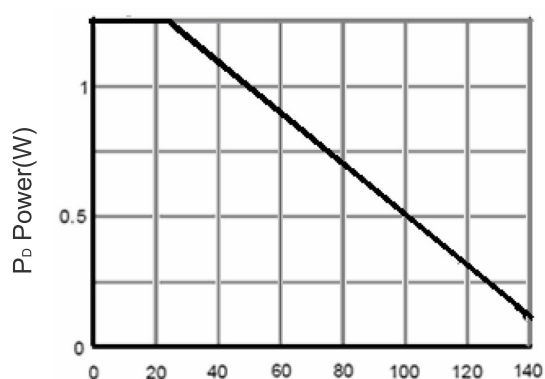


Figure 6 Drain-Source On-Resistance



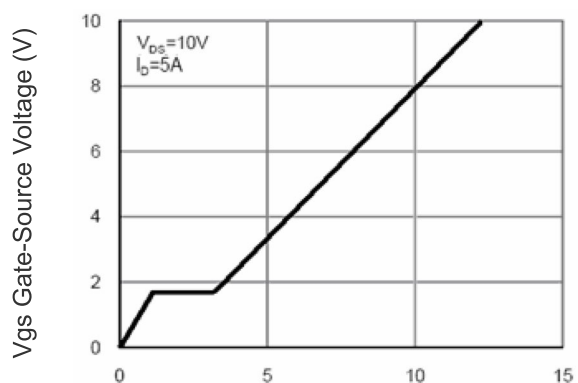
Vgs Gate-Source Voltage (V)

Figure 7 Rdson vs Vgs



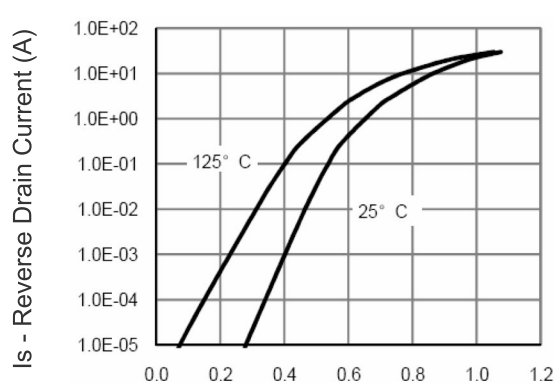
Tj - Junction Temperature(°C)

Figure 8 Power Dissipation



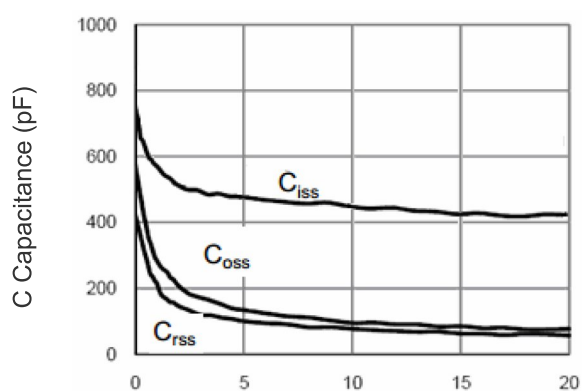
Qg Gate Charge (nC)

Figure 9 Gate Charge



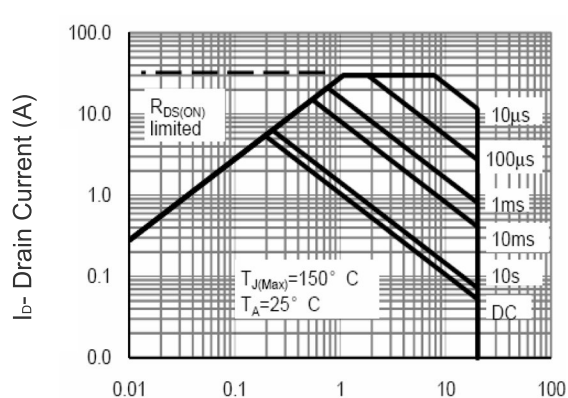
Vds Drain-Source Voltage (V)

Figure 10 Source- Drain Diode Forward



Vds Drain-Source Voltage (V)

Figure 11 Capacitance vs Vds



Vds Drain-Source Voltage (V)

Figure 12 Safe Operation Area

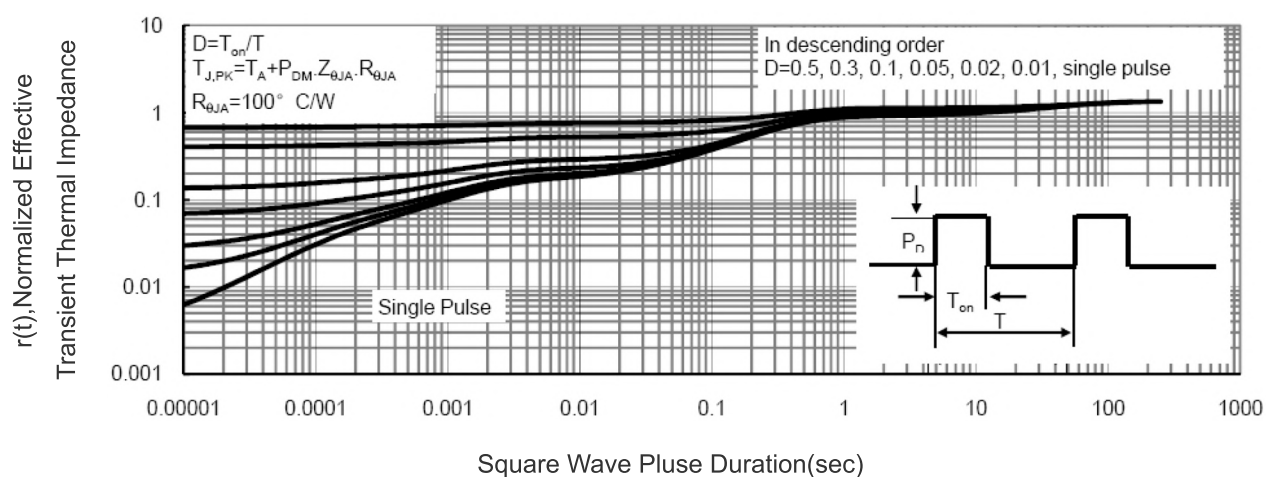
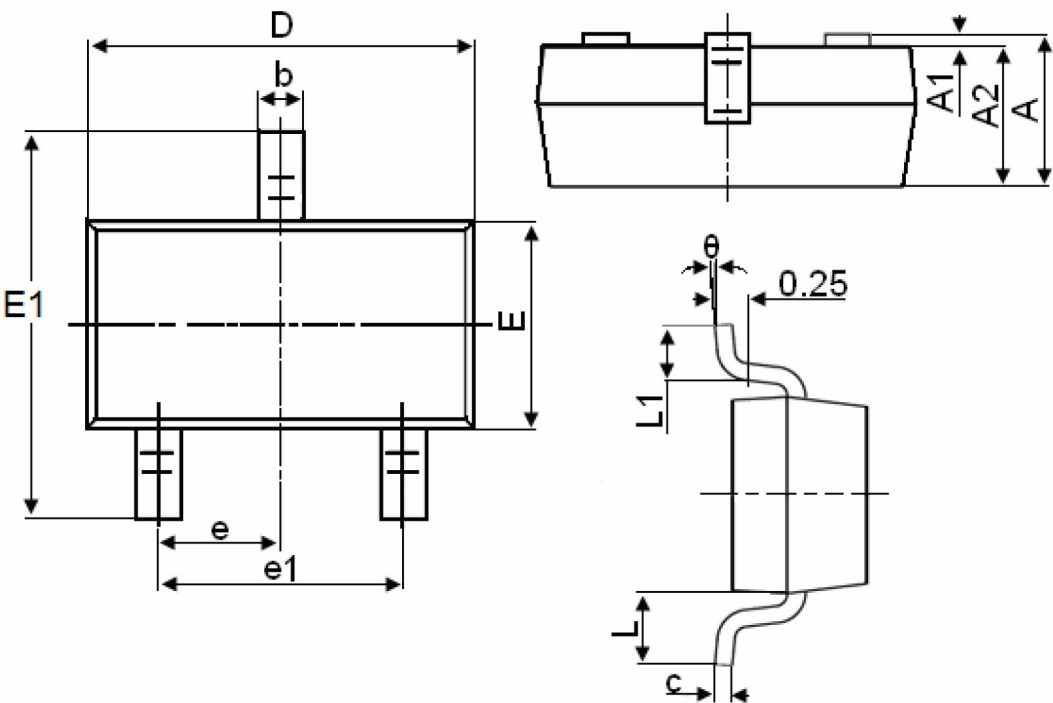


Figure 13 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

Notes:

- ① All dimensions are in millimeters.
- ② Tolerance ±0.10mm (4 mil) unless otherwise specified
- ③ Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
- ④ Dimension L is measured in gauge plane.
- ⑤ Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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