MJ P-Channel Enhancement Mode Power MOSFET

Description

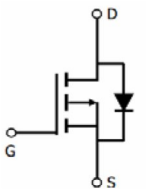
The MJ20P05Y uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

General Features

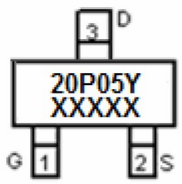
- ◆ V_{DS} =-20V,I_D =-5A
  $R_{DS(ON)}$ <25mΩ @ V_{GS} =-4.5V
  $R_{DS(ON)}$ <40mΩ @ V_{GS} =-2.5V
- ◆ High power and current handing capability
- ◆ Lead free product is acquired
- ◆ Surface Mount Package

Application

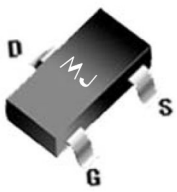
- ◆ Motor drive
- ◆ Load switch
- ◆ Power management



Schematic diagram



Marking and pin Assignment



SOT-23-3L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
20P05Y	MJ20P05Y	SOT23-3L	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings (T_C =25 ℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{DS}	±12	V
Drain Current-Continuous	I_D	-5	A
Pulsed Drain Current (Note 1)	I_{DM}	-20	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J ,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	83.3	℃/W

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	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =30V,V_{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS} =±12V,V_{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} =V_{GS} ,I_D =250μA	-0.5	-0.7	-1.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} =-4.5V, I_D =-5A	-	20	25	mΩ
		V_{GS} =-2.5V, I_D =-5A	-	30	40	mΩ
Forward Transconductance	g_{FS}	V_{DS} =-5V,I_D =-5A	-	17	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS} =-10V,V_{GS} =0V, F=1.0MHz	-	620	-	PF
Output Capacitance	C_{oss}		-	125	-	PF
Reverse Transfer Capacitance	C_{rss}		-	64	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD} =-10V, ,R_L =10Ω V_{GS} =-4.5V,R_{GEN} =6Ω	-	4.5	-	nS
Turn-on Rise Time	t_r		-	9.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	18.7	-	nS
Turn-Off Fall Time	t_f		-	3.3	-	nS
Total Gate Charge	Q_g	V_{DS} =-10V,I_D =-5A, V_{GS} =-4.5V	-	15	-	nC
Gate-Source Charge	Q_{gs}		-	1.8	-	nC
Gate-Drain Charge	Q_{gd}		-	2.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS} =0V,I_S =-5A	-		-1.2	V

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

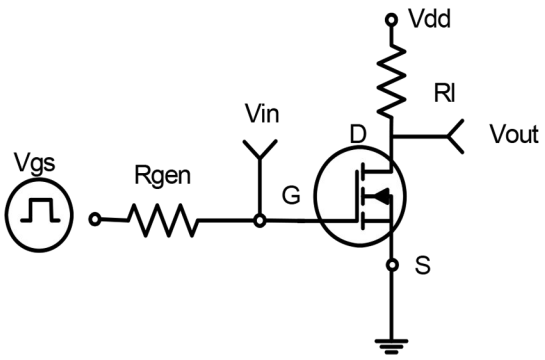


Figure 1 Switching Test Circuit

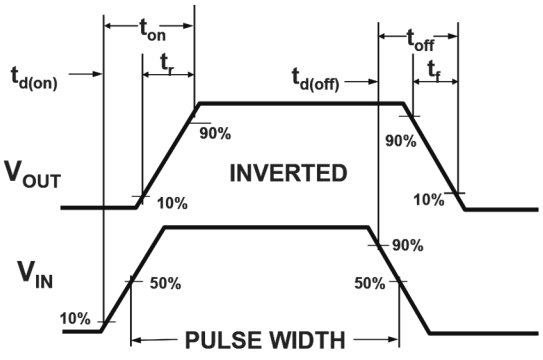


Figure 2 Switching Waveforms

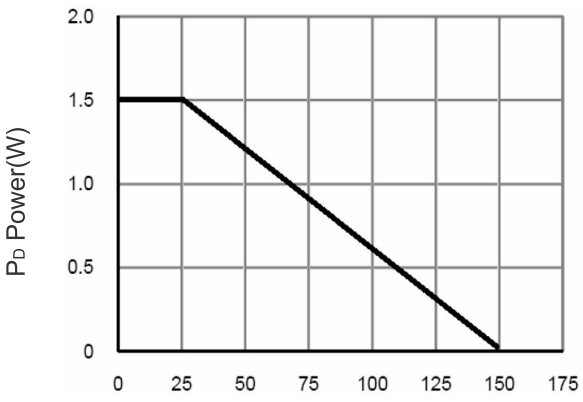


Figure 3 Power Dissipation

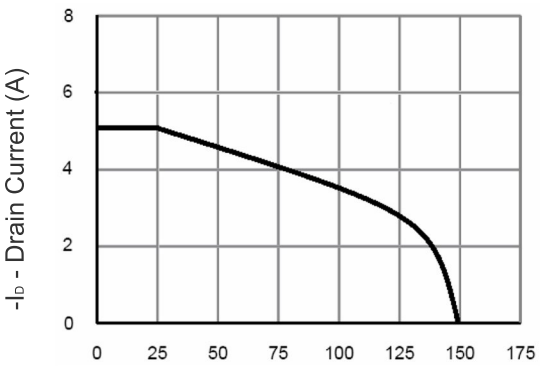


Figure 4 Drain Current

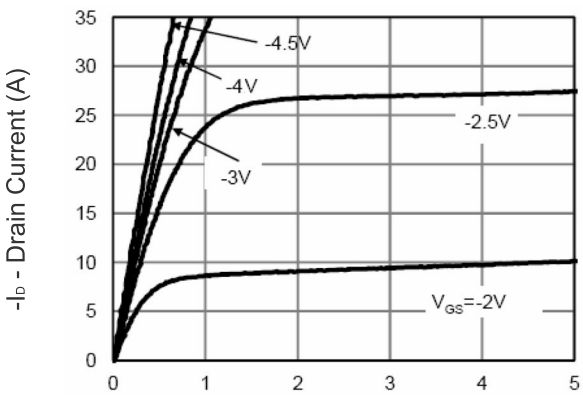


Figure 5 Output Characteristics

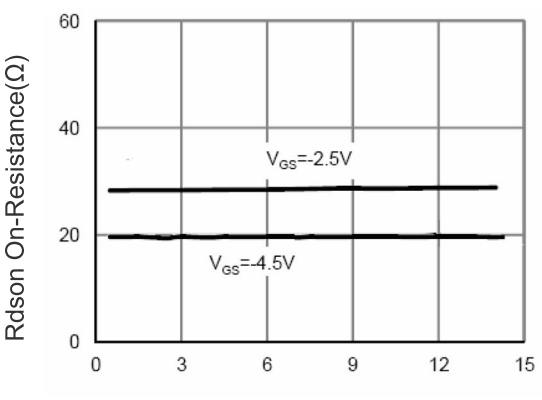


Figure 6 Drain-Source On-Resistance

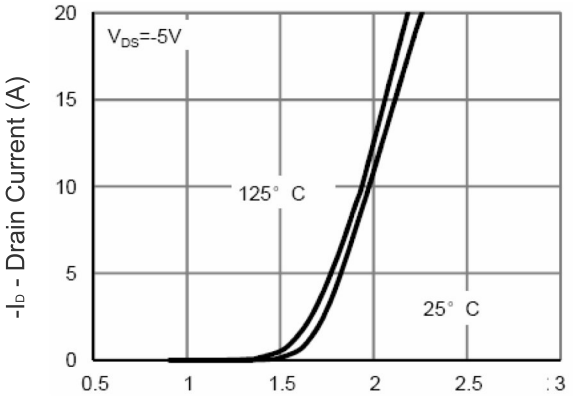


Figure 7 Transfer Characteristics

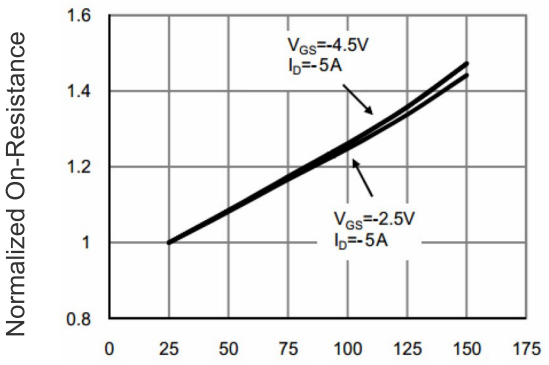


Figure 8 Drain-Source On-Resistance

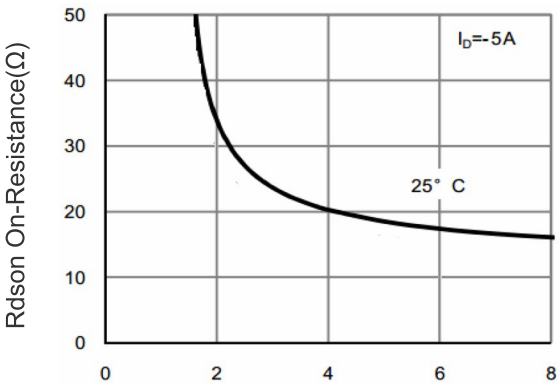


Figure 9 Rdson vs Vgs

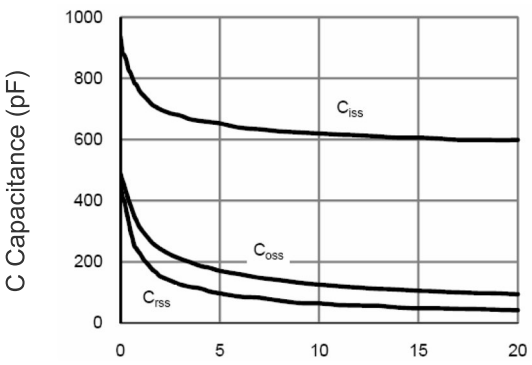


Figure 10 Capacitance vs Vds

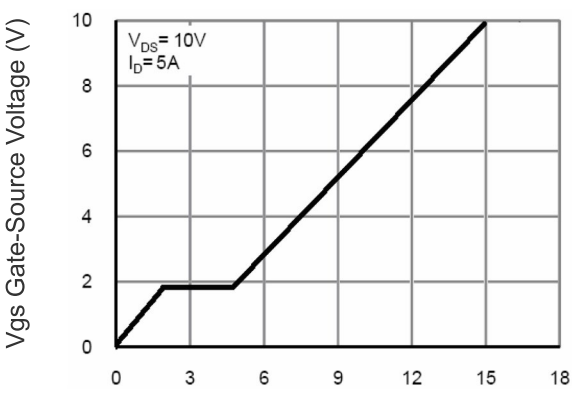


Figure 11 Gate Charge

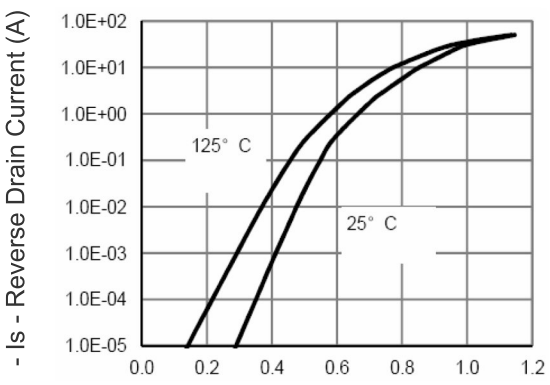


Figure 12 Source- Drain Diode Forward

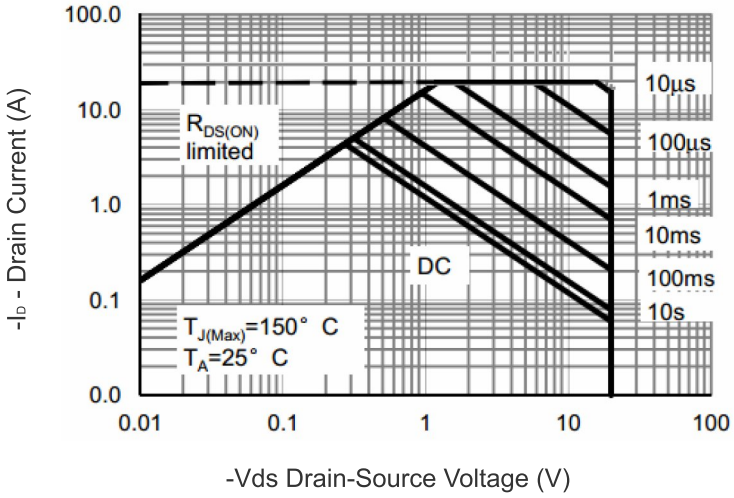


Figure 13 Safe Operation Area

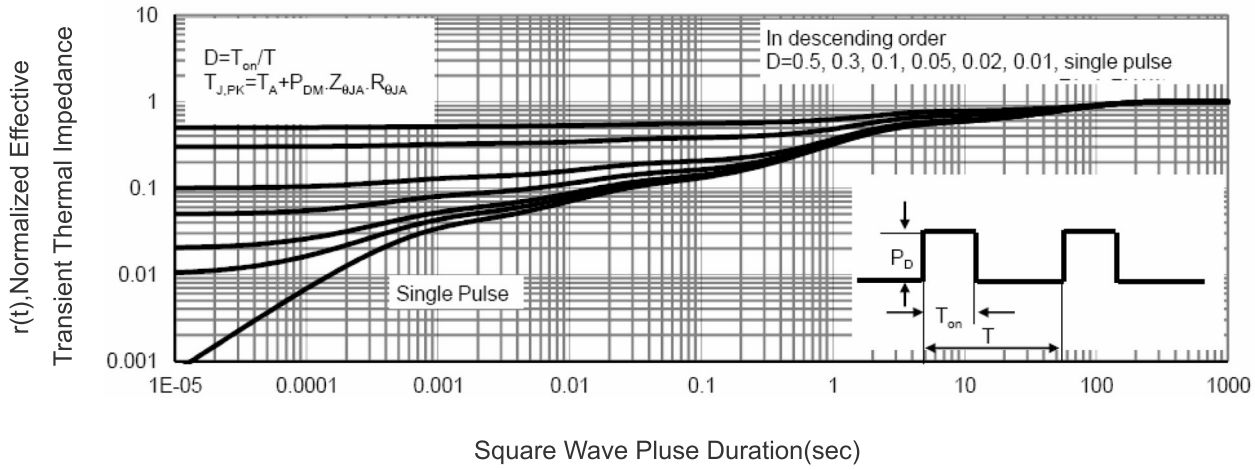
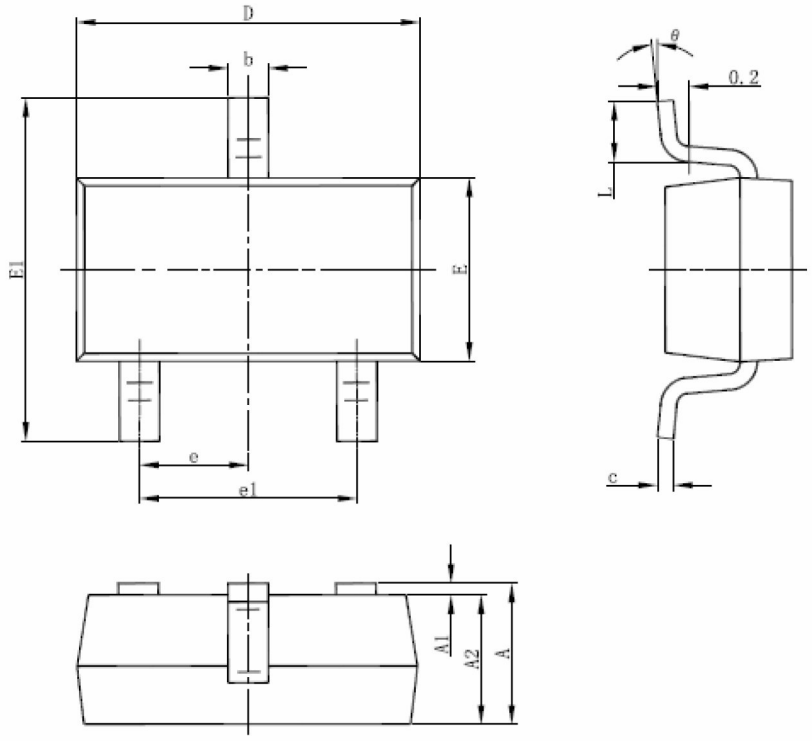


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	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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