N and P Channel 40V MOSFET

GENERAL DESCRIPTION

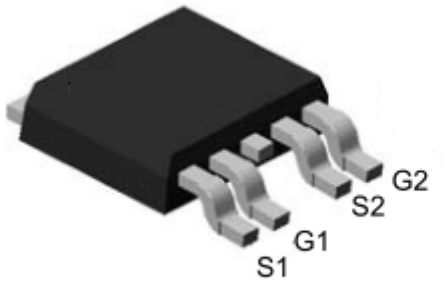
The JY13M is the N and P Channel logic enhancement mode power field transistors Which can provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications.

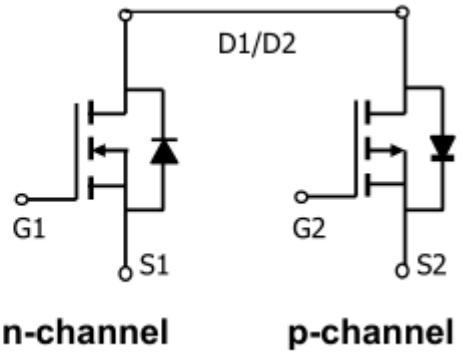
FEATURES

Device	$V_{BR(DSS)}$	$R_{DS(ON)\ MAX}$ T_J=25° C	Package
N-Channel	40V	<30mΩ@V_{GS}=10V,ID=12A	TO252-4L
		<40mΩ@V_{GS}=4.5V,ID=8A	
P-Channel	-40V	<45mΩ@V_{GS}=-10V,ID=-12A	
		<66mΩ@V_{GS}=-4.5V,ID=-8A	

- Low Input Capacitance
- Fast Switching Speed

PIN CONFIGURATION





Absolute Maximum Ratings(Ta=25° C Unless Otherwise Noted)

Parameter		Symbol	N Channel	P Channel	Unit
Drain Source Voltage		V_{DSS}	40	-40	V
Gate Source Voltage		V_{DSS}	±20	±20	
Continuous Drain Current	Ta=25° C	I_D	12	-12	A
	Ta=100° C		12	-12	
Pulsed Drain Current		I_{DM}	30	-30	
Maximum Power Dissipation	Ta=25° C	P_D	2		W
	Ta=70° C		1.3		
Junction and Storage Temperature Range		T_J T_{STG}	-55 to 150		° C
Thermal Resistance Junction to Ambient		$R_{\theta JA}$ 10s	25		ºC/W
		$R_{\theta JA}$ Steady	60		
Thermal Resistance Junction to Case		$R_{\theta JC}$	5.5	5	ºC/W

Electrical Characteristics(Ta=25° C Unless Otherwise Noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static							
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	N-Ch	1.7	2.5	3.0	V
		V_{DS}=V_{GS},I_D=-250uA	P-Ch	-1.7	-2	-3.0	
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±20V	N-Ch			±100	nA
			P-Ch			±100	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V	N-Ch			1	uA
		V_{DS}=-40V, V_{GS}=0V	P-Ch			-1	
$I_{D(ON)}$	On-State Drain Current	V_{DS}=5V, V_{GS}=10V	N-Ch	30			A
		V_{DS}=-5V, V_{GS}=-10V	P-Ch	-30			
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V,I_D=12A	N-Ch		24	30	mΩ
		V_{GS}=-10V,I_D=-12A	P-Ch		36	45	
		V_{GS}=4.5V,I_D=8A	N-Ch		31	40	
		V_{GS}=-4.5V,I_D=-8A	P-Ch		51	66	
V_{SD}	Diode Forward Voltage	I_S=1.0A,V_{GS}=0V	N-Ch		0.76	1.0	V
		I_S=-1.0A,V_{GS}=0V	P-Ch		-0.76	-1.0	

Electrical Characteristics(Ta=25ºC Unless Otherwise Noted**)**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Dynamic							
Qg	Total Gate Charge	N-Channel V_{DS}=20V,V_{GS}=10V, I_D=12A P-Channel V_{DS}=-20V,V_{GS}= -10V,I_D=-12A	N-Ch		8.3	10.8	nC
			P-Ch		16.2	21	
Qgs	Gate-Source Charge		N-Ch		2.3		
			P-Ch		3.8		
Qgd	Gate-Drain Charge		N-Ch		1.6		
			P-Ch		3.5		
Ciss	Input Capacitance	N-Channel V_{DS}=20V,V_{GS}=0V, f=1MHz P-Channel V_{DS}=-20V,V_{GS}=0V, f=1MHz	N-Ch		516	650	pF
			P-Ch		900	1125	
Coss	Output Capacitance		N-Ch		82		
			P-Ch		97		
Crss	Reverse Transfer Capacitance		N-Ch		43		
			P-Ch		68		
Rg	Gate Resistance	V_{DS}=0V,V_{GS}=0V, f=1MHz	N-Ch		4.6		Ω
			P-Ch		14		
$T_{d(on)}$	Turn-On Delay Time	N-Channel V_{DD}=20V,V_{GS}=10V, R_G=3Ω P-Channel V_{DD}=-20V,V_{GS}=-10 V, R_G=3Ω	N-Ch		6.4		ns
			P-Ch		6.2		
T_r	Turn-On Rise Time		N-Ch		3.6		
			P-Ch		8.4		
$T_{d(off)}$	Turn-Off Delay Time		N-Ch		16.2		
			P-Ch		44.8		
T_f	Turn-Off Fall Time		N-Ch		6.6		
			P-Ch		41.2		
T_{rr}	Reverse Recovery Time	I_F=12A, di/dt=100A/us	N-Ch		18		ns
			P-Ch		21		
Q_{rr}	Reverse Recovery Charge		N-Ch		10		nC
			P-Ch		14		

*The device mounted on 1in2 FR4 board with 2oz copper.

*Guaranteed by design. Not subject to product testing.

Typical Characteristics(T_J=25° C Noted) N-Channel

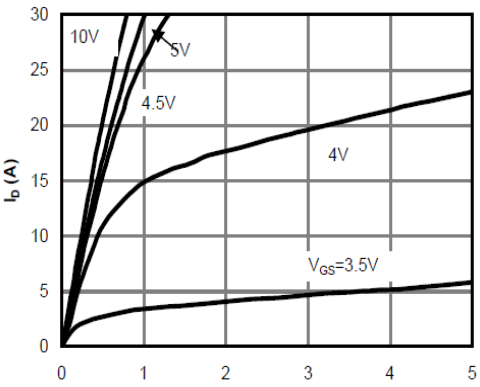


Figure1. Typical Output Characteristic

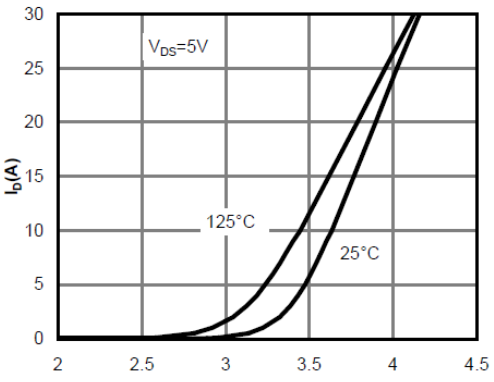


Figure2. Typical Transfer Characteristics

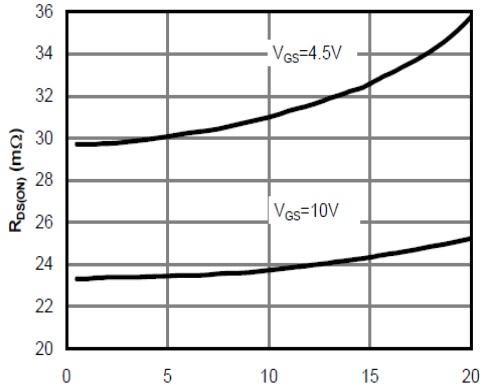


Figure3. Typical On-Resistance vs. Drain Current and Gate Voltage

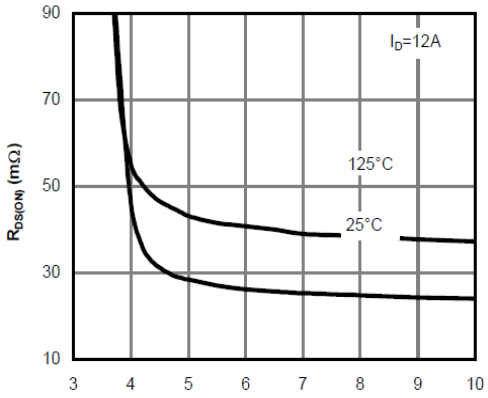


Figure4. Typical On-Resistance vs. Drain Current and Gate Voltage

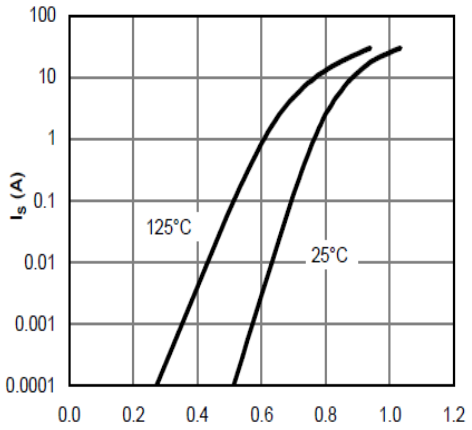


Figure5. Body-Diode Characteristics

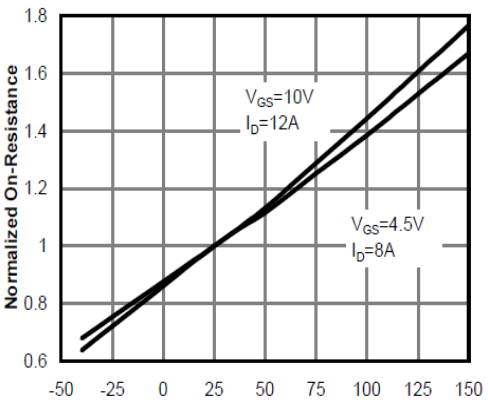
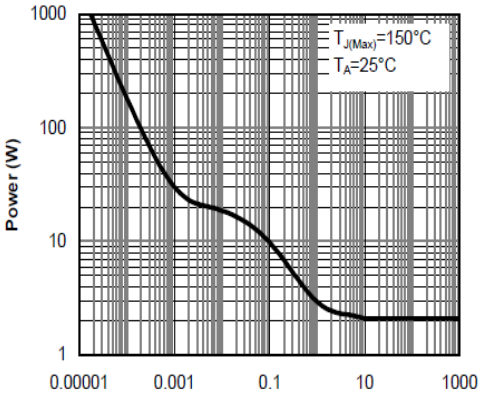


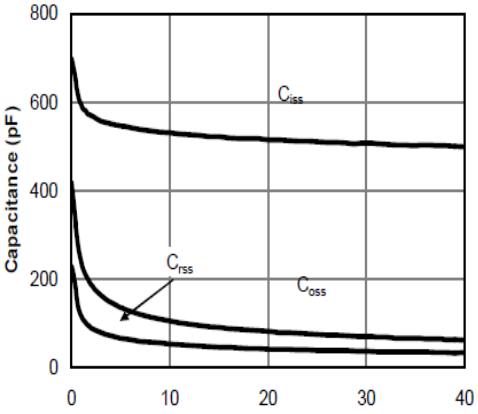
Figure6.On-Resistance Variation with Temperature

Typical Characteristics(T_J=25° C Noted) N-Channel



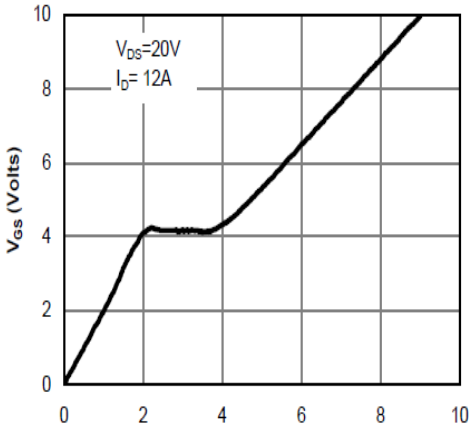
PW, Pulse Width

Figure9. Single Pulse Power Rating Junction-to-Ambient



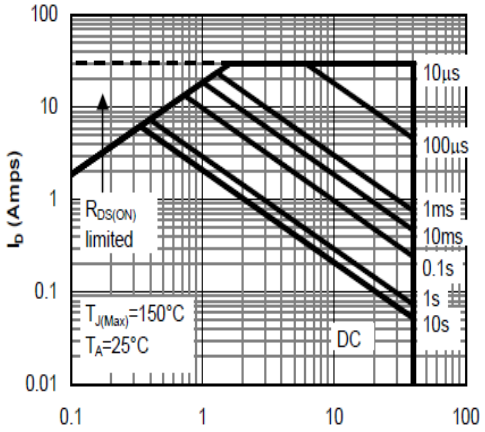
V_{DS},DRAIN-SOURCCE VOLTAGE

Figure10. Typical Junction Capacitance



Qg, TOTAL GATE CHARGE

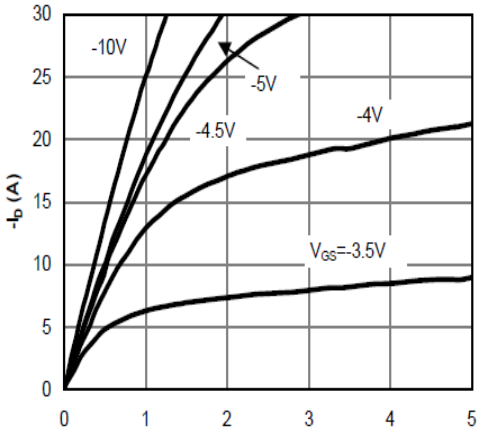
Figure11. Gate Charge



V_{DS},DRAIN-SOURCE VOLTAGE

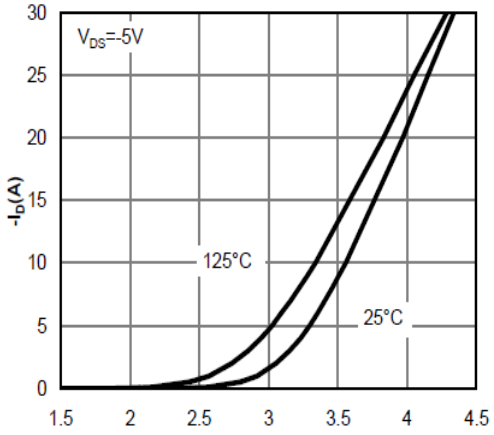
Figure12. SOA, Safe Operation Area

Typical Characteristics(T_J=25° C Noted) P-Channel



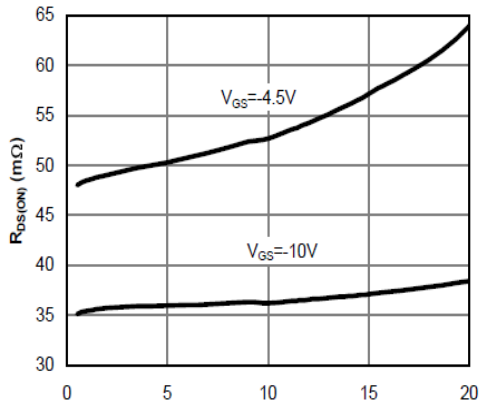
-V_{DS},DRAIN-SOURCE VOLTAGE

Figure13.Typical Output Characteristics



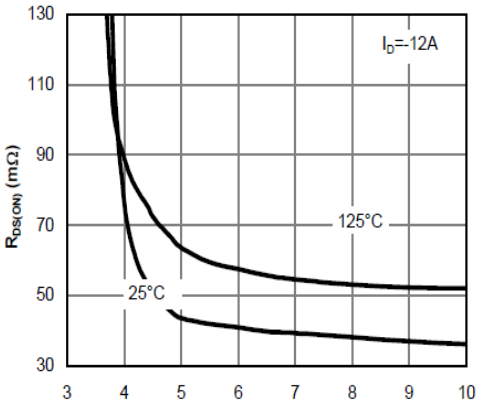
-V_{GS},GATE-SOURCE VOLTAGE

Figure14.Typical Transfer Characteristics



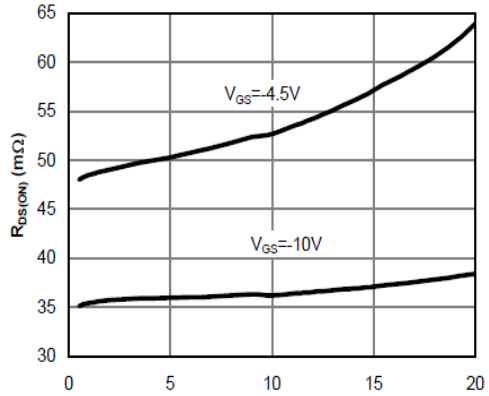
-I_D, DRAIN SOURCE CURRENT

Figure15. Typical On-Resistance vs. Drain Current and Gate Voltage



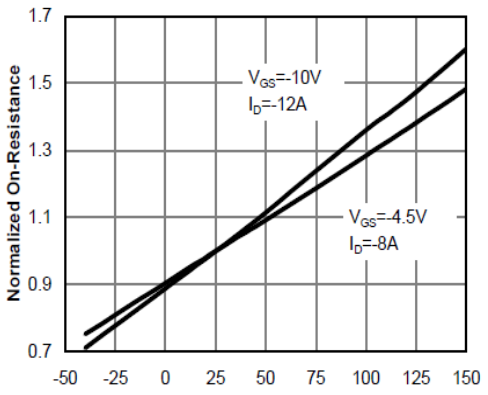
-V_{GS},GATE-SOURCE VOLTAGE

Figure16. Typical On-Resistance vs. Drain Current and Gate Voltage



-I_D, DRAIN SOURCE CURRENT

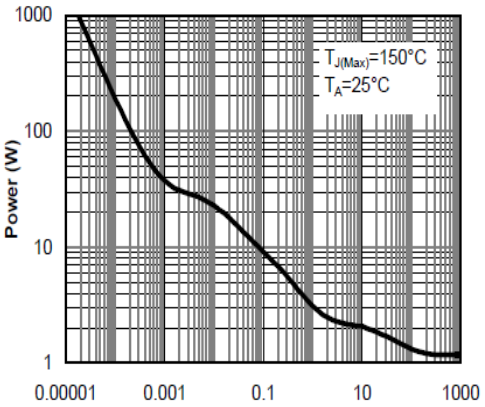
Figure17. Typical On-Resistance vs. Drain Current and Temperature



TJ, JUNCTION TEMPERATURE

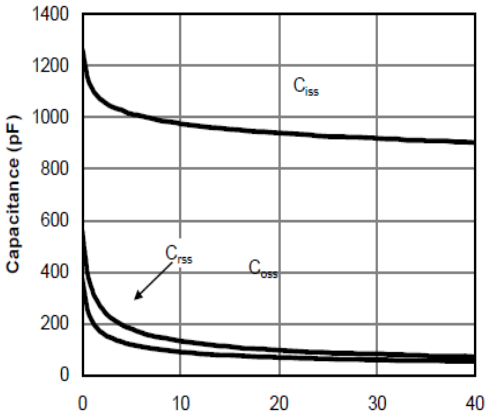
Figure18.On-Resistance Variation with Temperature

Typical Characteristics(T_J=25° C Noted) P-Channel



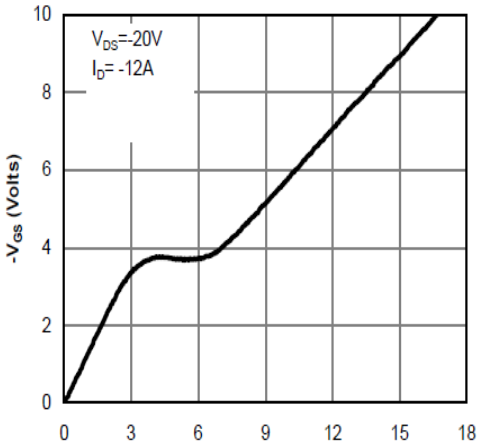
PW, Pulse Width

Figure21. Single Pulse Power Rating Junction-to-Ambient



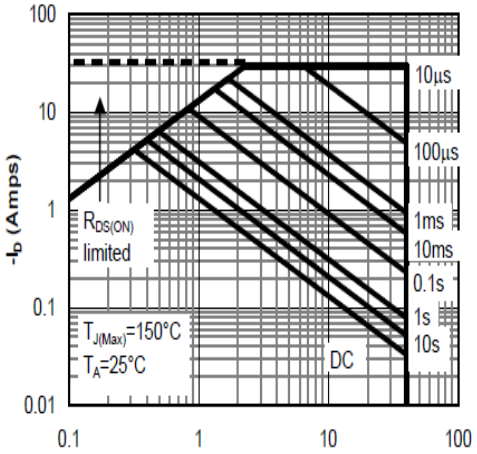
$-V_{DS}$,DRAIN-SOURCCE VOLTAGE

Figure22. Typical Junction Capacitance



Qg, TOTAL GATE CHARGE

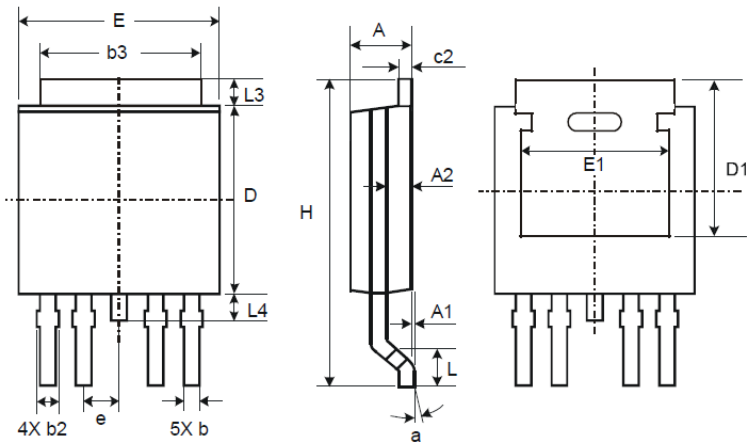
Figure23. Gate Charge



$-V_{DS}$,DRAIN-SOURCE VOLTAGE

Figure24. SOA, Safe Operation Area

TO252-4L Package Outline



TO252-4L			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.51	0.71	0.583
b2	0.61	0.79	0.70
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	–	–
e	–	–	1.27
E	6.45	6.70	6.58
E1	4.32	–	–
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	–
All Dimensions in mm			