GlobalPower SIDiscrete

GP2M013A050F

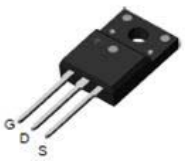
N-channel MOSFET

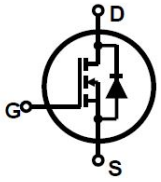
BV_{DSS}	I_D	$R_{DS(on)}$
500V	13A	<0.48Ω

Features

- Low gate charge
- Improved dv/dt capability
- RoHS compliant
- JEDEC Qualification

Top view TO-220F





Ordering Part Number	Package	Marking	Remark
GP2M013A050F	TO-220F	GP2M013A050F	RoHS

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C = 25 ℃	I_D	13	A
	T_C = 100 ℃		8.2	A
Pulsed Drain Current (Note 1)		I_{DM}	52	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	657	mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	13	A
Repetitive Avalanche Energy (Note 1)		E_{AR}	5.2	mJ
Power Dissipation	T_C = 25 ℃	P_D	52	W
	Derate above 25 ℃		0.41	W/℃
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~150	℃
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	℃

* Limited only by maximum junction temperature

Thermal Characteristics

Parameter	Symbol	Value	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	2.4	℃/W
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	℃/W

Electrical Characteristics : T_C=25℃, unless otherwise noted

Parameter	Symbol	Test condition	Min	Typ	Max	Unit
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 400 V, T_C = 125 ℃	--	--	10	μA
Forward Gate-Source Leakage Current	I_{GSSF}	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
Reverse Gate-Source Leakage Current	I_{GSSR}	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
ON						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	3.0	--	5.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 6.5 A	--	0.38	0.48	Ω
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 6.5 A	--	5	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1798	--	pF
Output Capacitance	C_{oss}		--	200	--	pF
Reverse Transfer Capacitance	C_{rss}		--	13	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 250 V, I_D = 13 A, R_G = 25 Ω	--	37	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	61	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	120	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	42	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 400 V, I_D = 13 A, V_{GS} = 10 V	--	35	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	8	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	14	--	nC
SOURCE DRAIN DIODE						
Maximum Continuous Drain-Source Diode Forward Current	I_S	----	--	--	13	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	----	--	--	52	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 13 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 13 A, dI_F / dt = 100 A/μs	--	540	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}		--	3.5	--	μC

Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L=7mH, I_{AS} = 13A, V_{DD} = 50V, R_G = 25Ω, Starting T_J= 25 ℃, not subject to production test – verified by design/characterization
3 I_{SD} ≤ 13A, di/dt ≤ 200A/μs , V_{DD} ≤ BV_{DS}, Starting T_J= 25 ℃
4. Pulse Test :Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Fig. 1 Output Characteristics

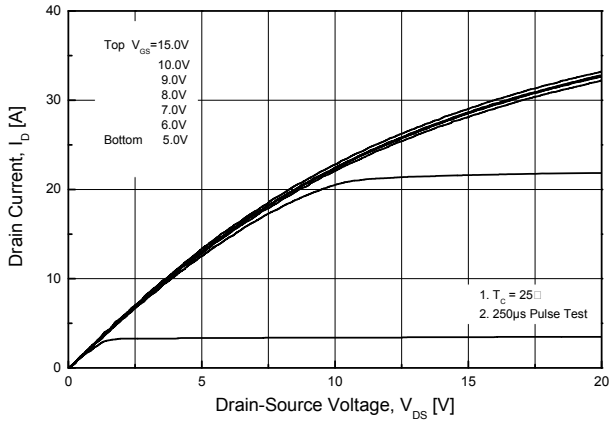


Fig. 2 Transfer Characteristics

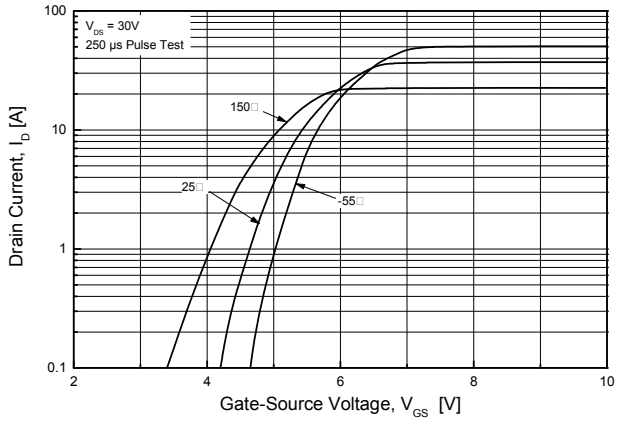


Fig. 3 On-Resistance vs.
Drain Current and Gate voltage

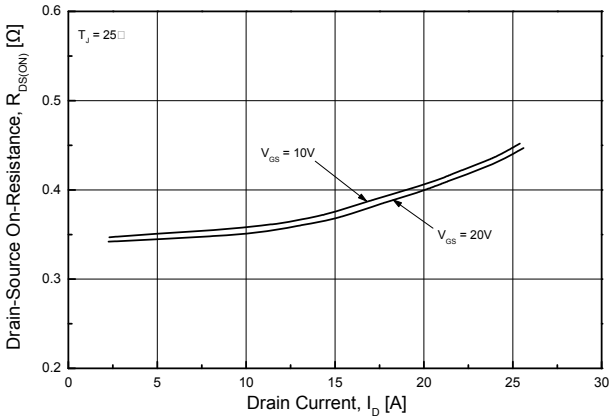


Fig. 4 Body Diode Forward Voltage vs.
Source Current and Temperature

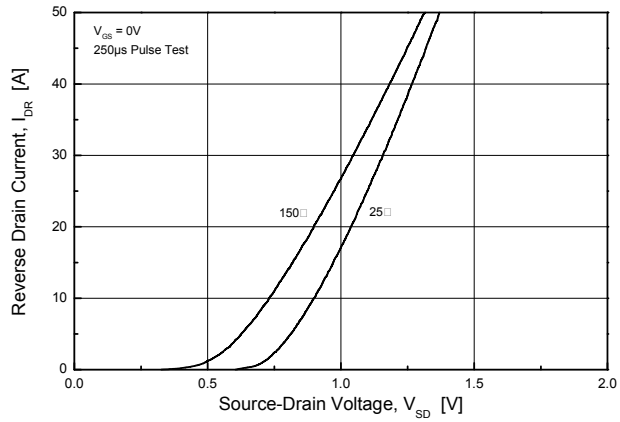


Fig. 5 Capacitance Characteristics

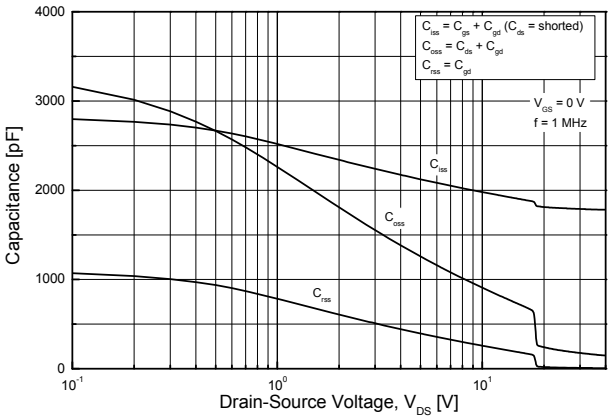


Fig. 6 Gate Charge Characteristics

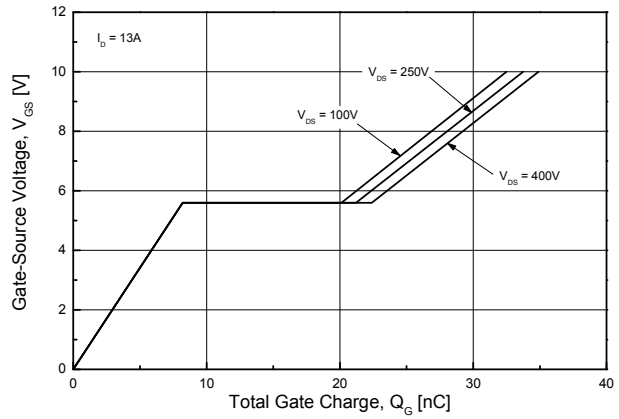


Fig. 7 Breakdown Voltage vs. Temperature

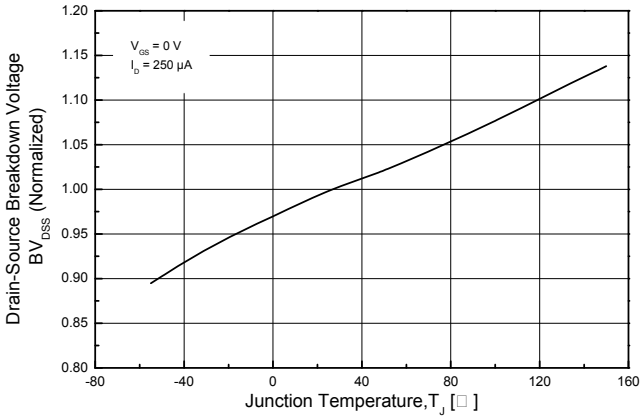


Fig. 8 On-Resistance vs. Temperature

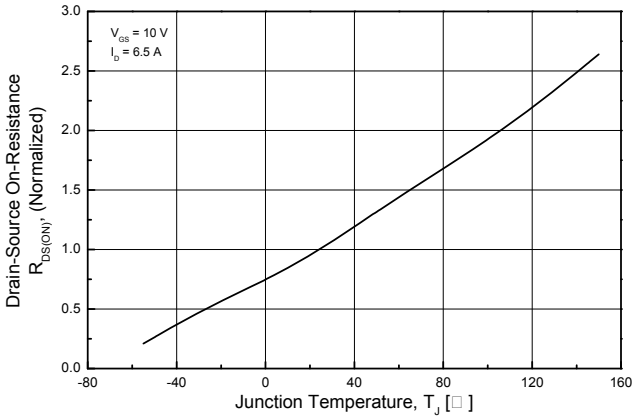


Fig. 9 Maximum Drain Current vs. Case Temperature

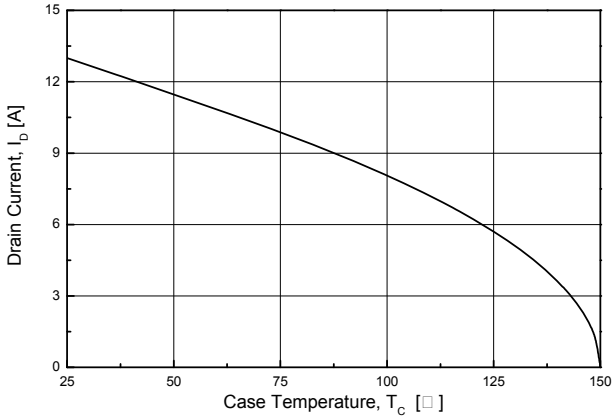


Fig. 10 Gate Threshold Voltage vs. Junction Temperature

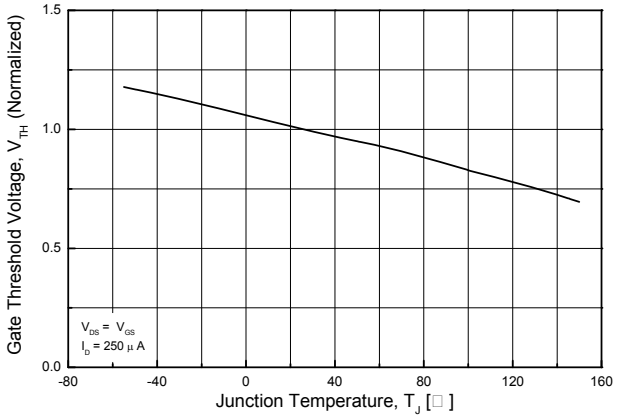


Fig. 11 Maximum Safe Operating Area

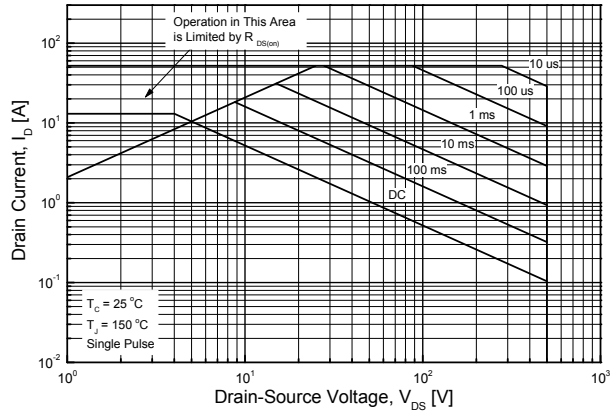
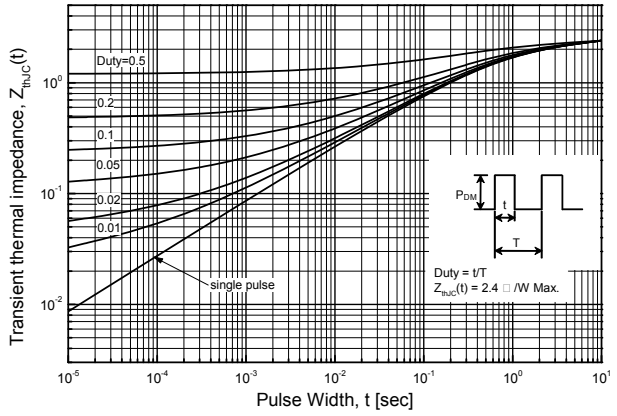
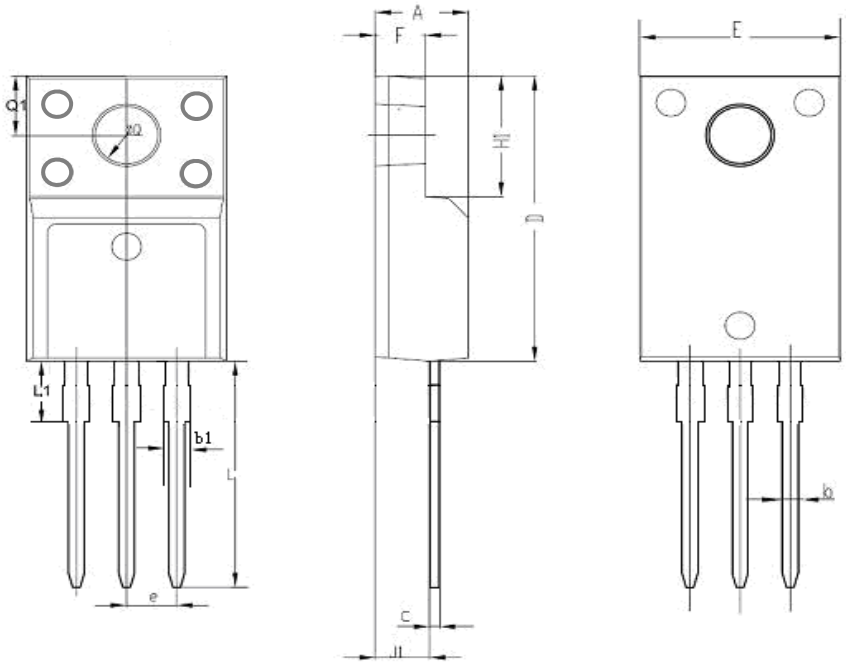


Fig. 12 Transient Thermal Response Curve



TO-220F-3L MECHANICAL DATA



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.178	0.194	4.53	4.93	
b	0.028	0.036	0.71	0.91	
C	0.018	0.024	0.45	0.60	
D	0.617	0.633	15.67	16.07	
E	0.392	0.408	9.96	10.36	
e	0.100 TYP.		2.54TYP.		
H1	0.256	0.272	6.50	6.90	
J1	0.101	0.117	2.56	2.96	
L	0.503	0.519	12.78	13.18	
φQ	0.117	0.133	2.98	3.38	
b1	0.045	0.055	1.15	1.39	
L1	0.114	0.130	2.9	3.3	
Q1	0.122	0.138	3.10	3.50	
F	0.092	0.108	2.34	2.74	