

## BP2054

### N-CHANNEL ENHANCEMENT MODE POWER MOSFET

BV <sub>DSS</sub>	20V
R <sub>DS(ON)</sub>	32mΩ
I <sub>D</sub>	5.3A

### Description

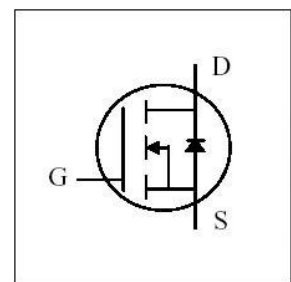
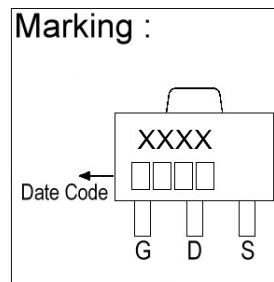
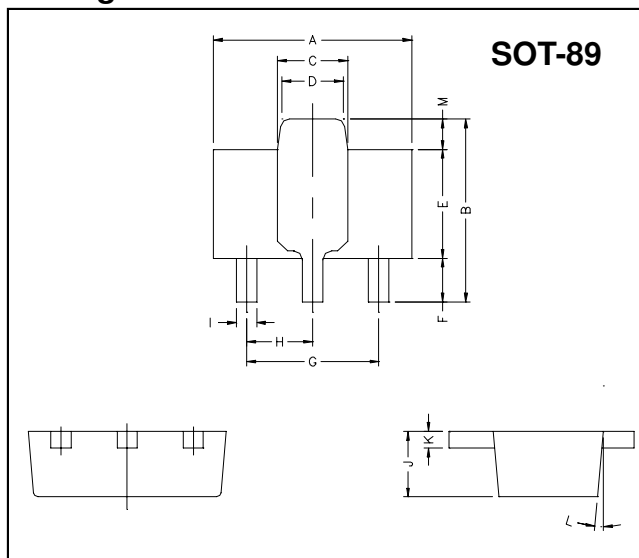
The BP2054 utilized advanced processing techniques to achieve the lowest possible on-resistance, extremely efficient and cost-effectiveness device.

The BP2054 is universally used for all commercial-industrial surface mount applications.

### Features

- \*Capable of 2.5V gate drive
- \*Lower on-resistance

### Package Dimensions



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.4	4.6	G	3.00	REF.
B	4.05	4.25	H	1.50	REF.
C	1.50	1.70	I	0.40	0.52
D	1.30	1.50	J	1.40	1.60
E	2.40	2.60	K	0.35	0.41
F	0.89	1.20	L	5° TYP.	
			M	0.70 REF.	

### Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V <sub>DS</sub>	20	V
Gate-Source Voltage	V <sub>GS</sub>	±12	V
Continuous Drain Current <sup>3</sup> , V <sub>GS</sub> @4.5V	I <sub>D</sub> @TA=25°C	5.3	A
Continuous Drain Current <sup>3</sup> , V <sub>GS</sub> @4.5V	I <sub>D</sub> @TA=70°C	4.3	A
Pulsed Drain Current <sup>1,2</sup>	I <sub>DM</sub>	10	A
Power Dissipation	P <sub>D</sub> @TA=25°C	1.5	W
Linear Derating Factor		0.012	W/°C
Operating Junction and Storage Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-55 ~ +150	°C

### Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-ambient <sup>3</sup> Max.	R <sub>thj-a</sub>	83.3	°C/W

## Electrical Characteristics (T<sub>j</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250uA
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> / ΔT <sub>j</sub>	-	0.1	-	V/°C	Reference to 25°C, I <sub>D</sub> =1mA
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.5	-	1.2	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA
Forward Transconductance	g <sub>fs</sub>	-	13	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =5.3A
Gate-Source Leakage Current	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±12V
Drain-Source Leakage Current(T <sub>j</sub> =25°C)	I <sub>DSS</sub>	-	-	1	uA	V <sub>DS</sub> =20V, V <sub>GS</sub> =0
Drain-Source Leakage Current(T <sub>j</sub> =55°C)		-	-	10	uA	V <sub>DS</sub> =16V, V <sub>GS</sub> =0
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	-	-	30	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =5.5A
		-	-	35		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5.3A
		-	-	50		V <sub>GS</sub> =2.5V, I <sub>D</sub> =2.6A
		-	-	90		V <sub>GS</sub> =1.8V, I <sub>D</sub> =1.0A
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	-	8.7	-	nC	I <sub>D</sub> =5.3A V <sub>DS</sub> =10V V <sub>GS</sub> =4.5V
Gate-Source Charge	Q <sub>gs</sub>	-	1.5	-		
Gate-Drain ("Miller") Change	Q <sub>gd</sub>	-	3.6	-		
Turn-on Delay Time <sup>2</sup>	T <sub>d(on)</sub>	-	6	-	ns	V <sub>DS</sub> =15V I <sub>D</sub> =1A V <sub>GS</sub> =10V R <sub>G</sub> =2 R <sub>D</sub> =15
Rise Time	T <sub>r</sub>	-	14	-		
Turn-off Delay Time	T <sub>d(off)</sub>	-	18.4	-		
Fall Time	T <sub>f</sub>	-	2.8	-		
Input Capacitance	C <sub>iss</sub>	-	603	-	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =15V f=1.0MHz
Output Capacitance	C <sub>oss</sub>	-	144	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	111	-		

## Source-Drain Diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage <sup>2</sup>	V <sub>SD</sub>	-	-	1.2	V	I <sub>S</sub> =1.2A, V <sub>GS</sub> =0V
Reverse Recovery Time <sup>2</sup>	T <sub>rr</sub>	-	16.8	-	ns	I <sub>S</sub> =5A, V <sub>GS</sub> =0V
Reverse Recovery Charge	Q <sub>rr</sub>	-	11	-	nC	dI/dt=100A/μs

Notes: 1. Pulse width limited by Max. junction temperature.

2. Pulse width ≤ 300us, duty cycle ≤ 2%.

3. Surface mounted on FR4 board, t ≤ 10sec.

## Characteristics Curve

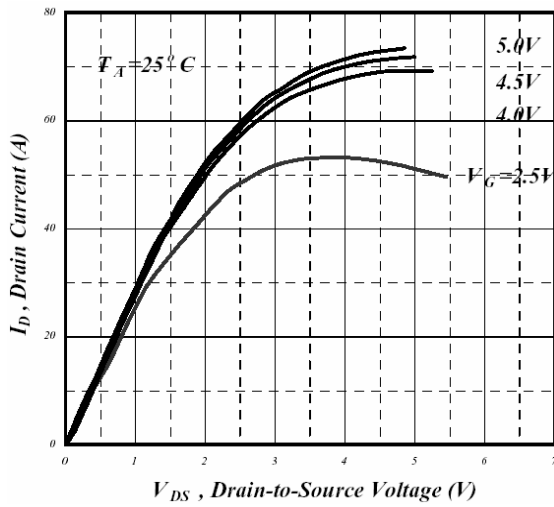


Fig 1. Typical Output Characteristics

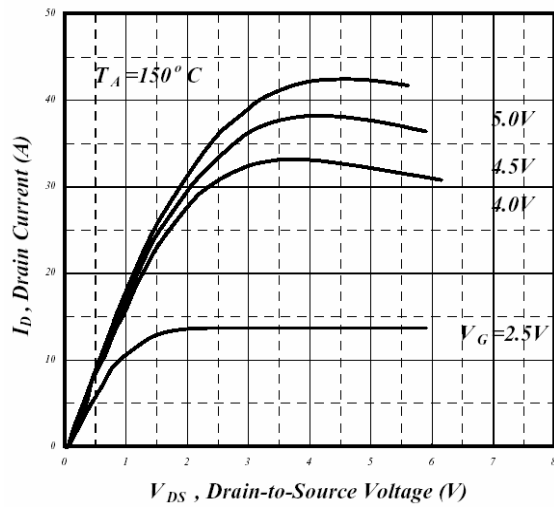


Fig 2. Typical Output Characteristics

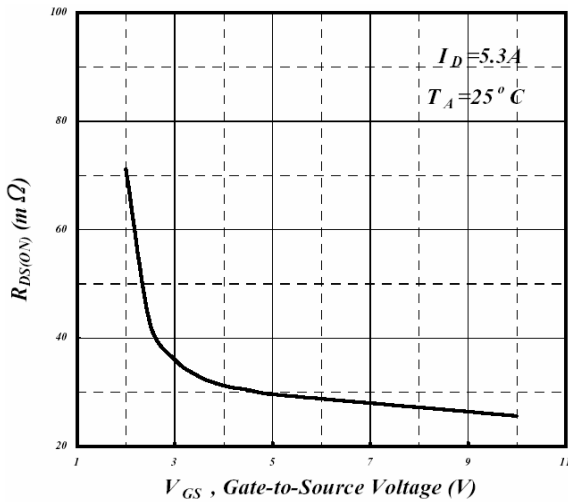


Fig 3. On-Resistance v.s. Gate Voltage

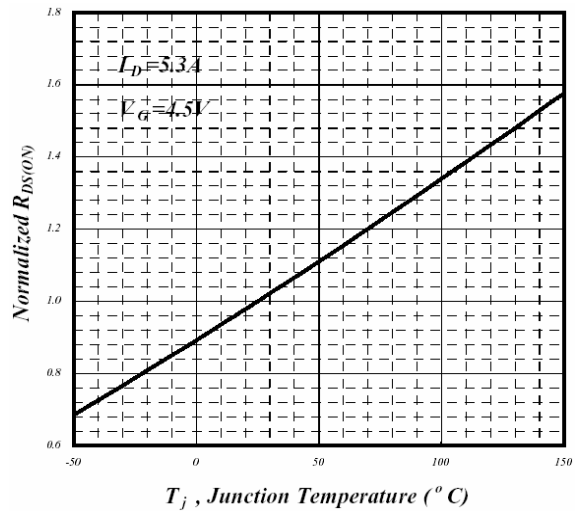


Fig 4. Normalized On-Resistance v.s. Junction Temperature

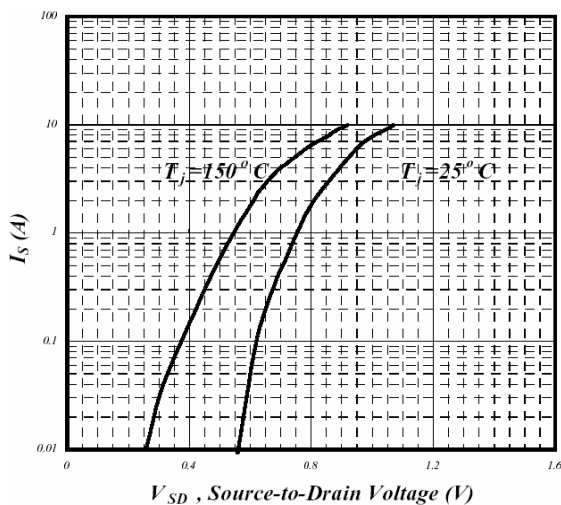


Fig 5. Forward Characteristics of Reverse Diode

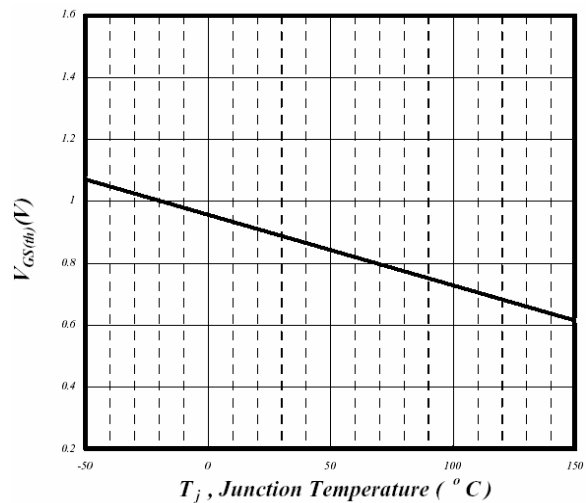
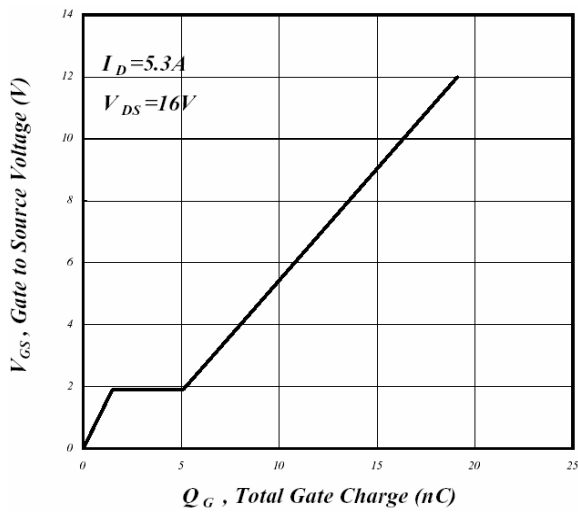
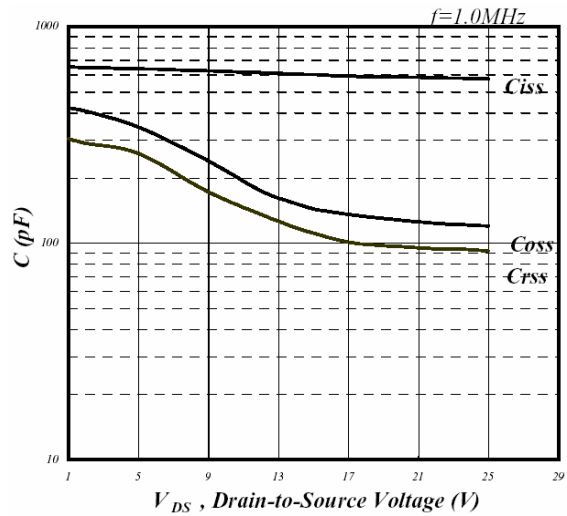


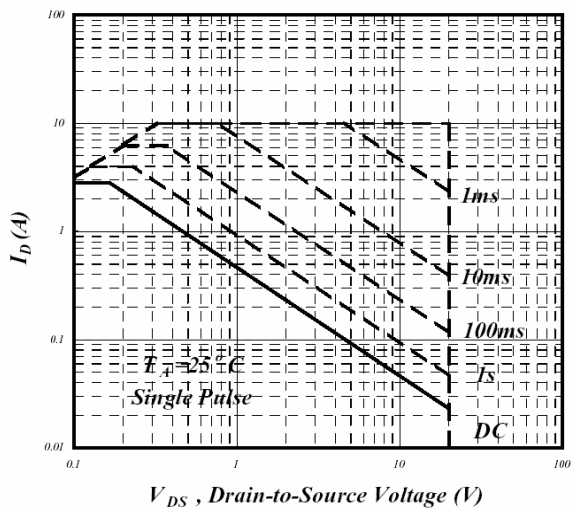
Fig 6. Gate Threshold Voltage v.s. Junction Temperature



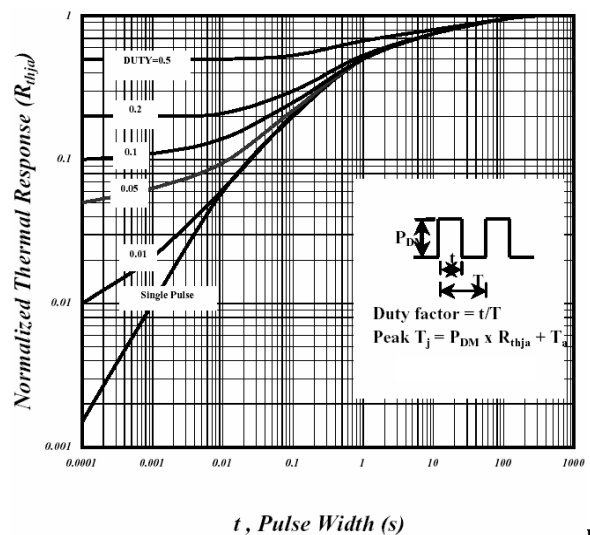
**Fig 7. Gate Charge Characteristics**



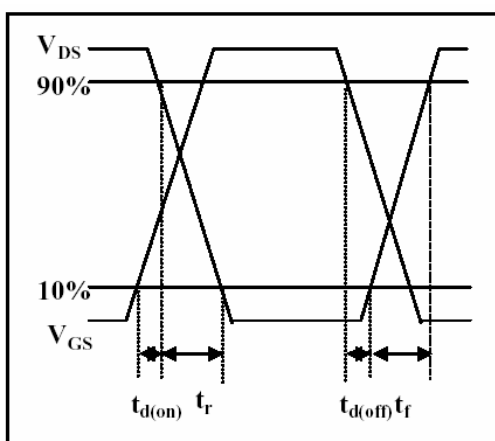
**Fig 8. Typical Capacitance Characteristics**



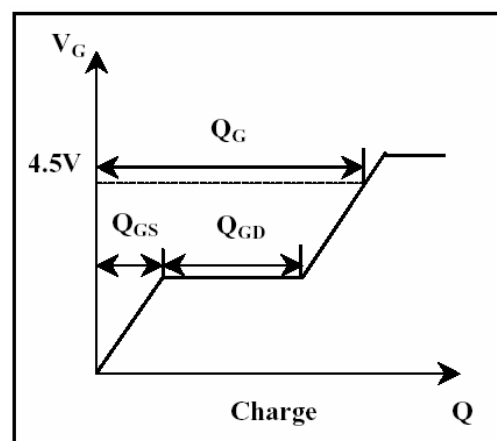
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Waveform**



**Fig 12. Gate Charge Waveform**