BETTER POWER

BP140N

|	
BV$_{DSS}$	30 V
R$_{DS(ON)}$	13mΩ
I$_D$	54A

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

Description
The BP140N provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.
The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

Features
*Simple Drive Requirement
*Low Gate Charge
*Fast Switching

Package Dimensions

TO-252
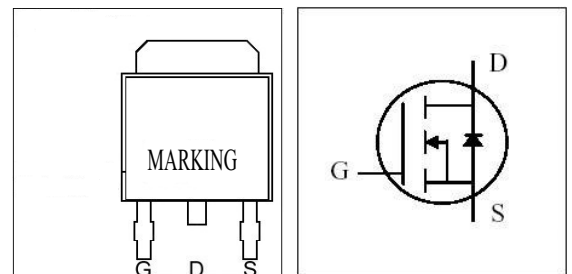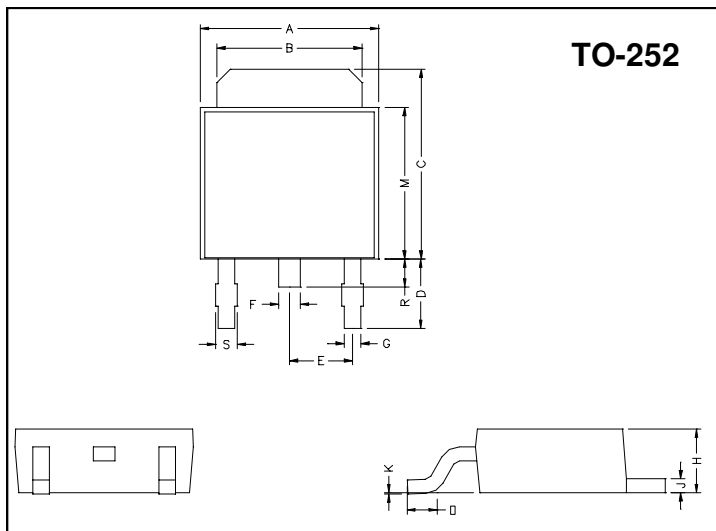
REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	6.40	6.80	G	0.50	0.70
B	5.20	5.50	H	2.20	2.40
C	6.80	7.20	J	0.45	0.55
D	2.40	3.00	K	0	0.15
E	2.30 REF.		L	0.90	1.50
F	0.70	0.90	M	5.40	5.80
S	0.60	0.90	R	0.80	1.20

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V$_{DS}$	30	V
Gate-Source Voltage	V$_{GS}$	±20	V
Continuous Drain Current, V$_{GS}$@10V	I$_D$ @T$_C$=25℃	54	A
Continuous Drain Current, V$_{GS}$@10V	I$_D$ @T$_C$=100℃	32	A
Pulsed Drain Current[1]	I$_{DM}$	150	A
Total Power Dissipation	P$_D$ @T$_C$=25℃	62.5	W
Linear Derating Factor		0.5	W/℃
Operating Junction and Storage Temperature Range	Tj, Tstg	-55 ~ +150	℃

Thermal Data

Parameter		Symbol	Value	Unit
Thermal Resistance Junction-case	Max.	Rthj-c	2.0	℃/W
Thermal Resistance Junction-ambient	Max.	Rthj-a	110	℃/W

Electrical Characteristics (Tj = 25℃ unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	BV_{DSS}	25	-	-	V	$V_{GS}=0$, $I_D=250uA$
Breakdown Voltage Temperature Coefficient	$\triangle BV_{DSS}/\triangle Tj$	-	0.037	-	V/℃	Reference to 25℃, $I_D=1mA$
Gate Threshold Voltage	$V_{GS(th)}$	1.0	-	3.0	V	$V_{DS}=V_{GS}$, $I_D=250uA$
Forward Transconductance	g_{fs}	-	15.6	-	S	$V_{DS}=10V$, $I_D=25A$
Gate-Source Leakage Current	I_{GSS}	-	-	±100	nA	$V_{GS}=±20V$
Drain-Source Leakage Current(Tj=25℃)	I_{DSS}	-	-	1	uA	$V_{DS}=30V$, $V_{GS}=0$
Drain-Source Leakage Current(Tj=150℃)		-	-	25	uA	$V_{DS}=20V$, $V_{GS}=0$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	-	13	m	$V_{GS}=10V$, $I_D=25A$
		-	-	16		$V_{GS}=4.5V$, $I_D=20A$
Total Gate Charge[2]	Q_g	-	21	-	nC	$I_D=25A$ $V_{DS}=20V$ $V_{GS}=5V$
Gate-Source Charge	Q_{gs}	-	2.8	-		
Gate-Drain ("Miller") Change	Q_{gd}	-	16	-		
Turn-on Delay Time[2]	$T_{d(on)}$	-	8	-	ns	$V_{DS}=15V$ $I_D=20A$ $V_{GS}=10V$ $R_G=3.3$ $R_D=0.75$
Rise Time	T_r	-	75	-		
Turn-off Delay Time	$T_{d(off)}$	-	22	-		
Fall Time	T_f	-	20	-		
Input Capacitance	C_{iss}	-	605	-	pF	$V_{GS}=0V$ $V_{DS}=25V$ $f=1.0MHz$
Output Capacitance	C_{oss}	-	415	-		
Reverse Transfer Capacitance	C_{rss}	-	195	-		

Source-Drain Diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward On Voltage[2]	V_{SD}	-	-	1.26	V	$I_S=50A$, $V_{GS}=0V$, Tj=25℃
Continuous Source Current (Body Diode)	I_S	-	-	50	A	$V_D=V_G=0V$, $V_S=1.26V$
Pulsed Source Current (Body Diode)[1]	I_{SM}	-	-	150	A	

Drain-Source Avalanche Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Single Pulse Avalanche Energy[2]	E_{AS}	-	-	61	mJ	$V_{DD}=25V$, $I_D=35A$, L=100uH $V_{GS}=10V$,
Avalanche Current	I_{AR}	-	-	35	A	

Notes: 1. Pulse width limited by safe operating area.

2. Pulse width≦300us, duty cycle≦2%.

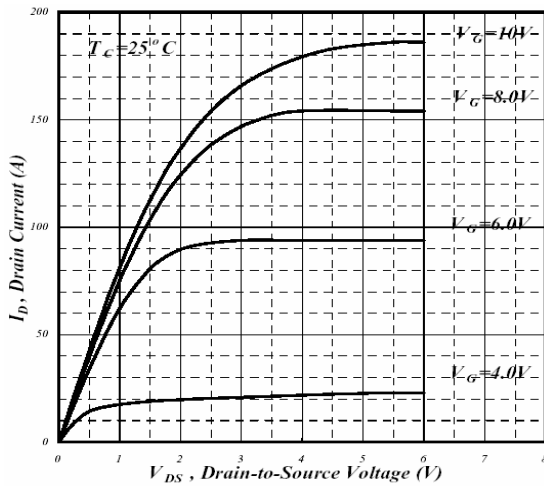## Characteristics Curve

Fig 1. Typical Output Characteristics
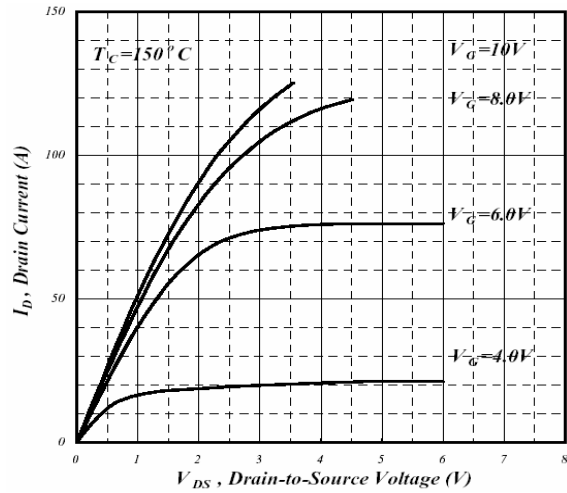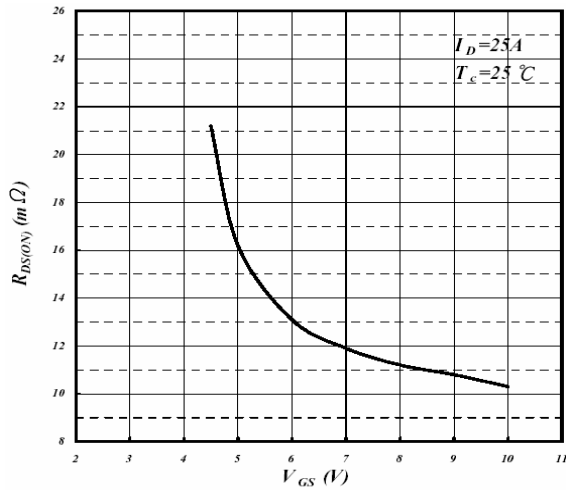

Fig 2. Typical Output Characteristics

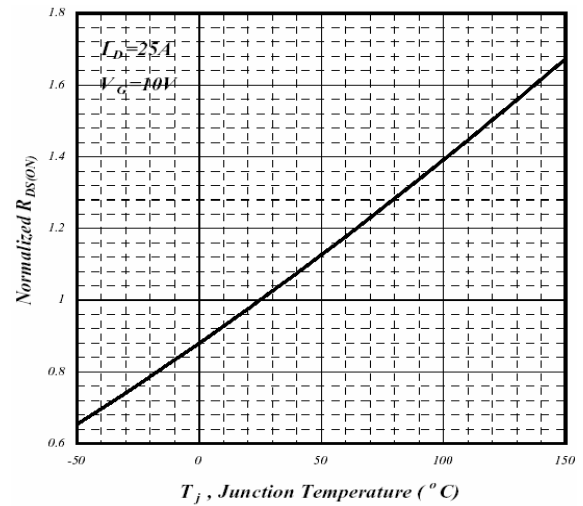**Fig 3. On-Resistance v.s. Gate Voltage**
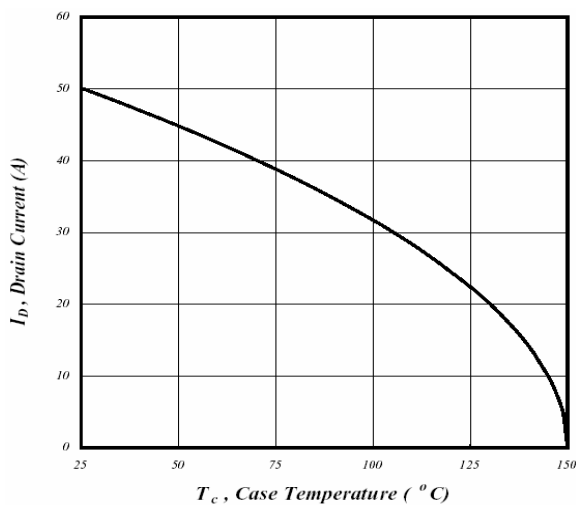

**Fig 4. Normalized On-Resistance
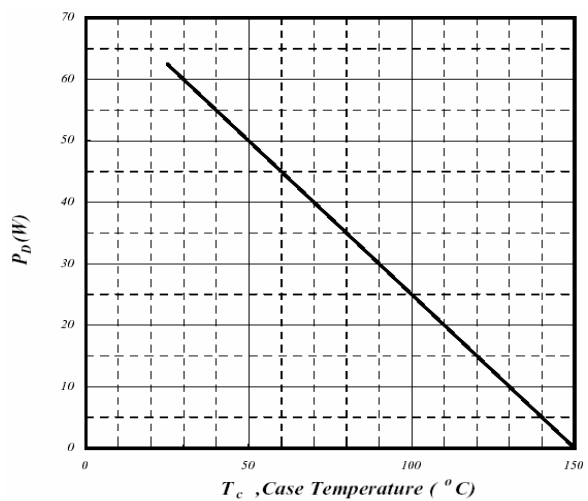v.s. Junction Temperature**

**Fig 5. Maximum Drain Current
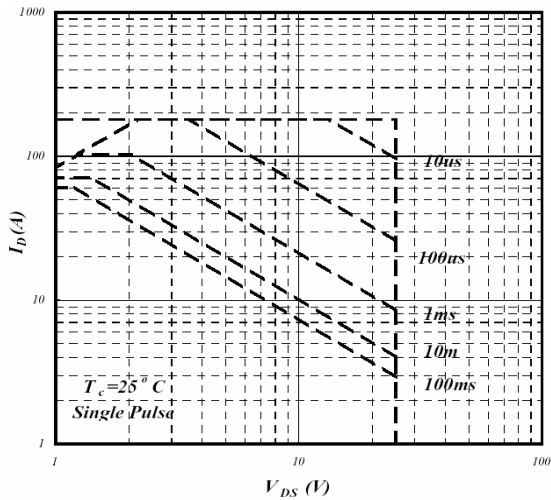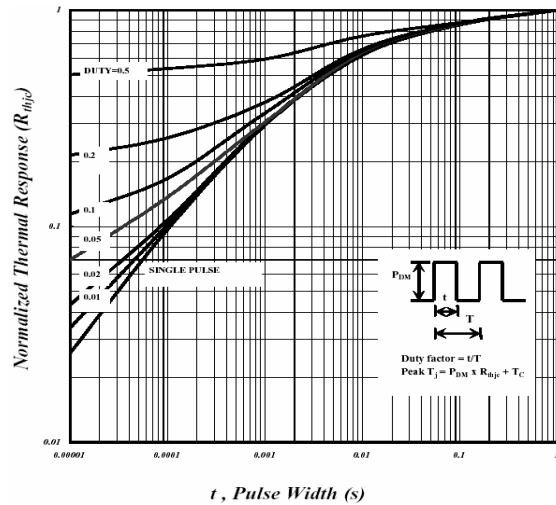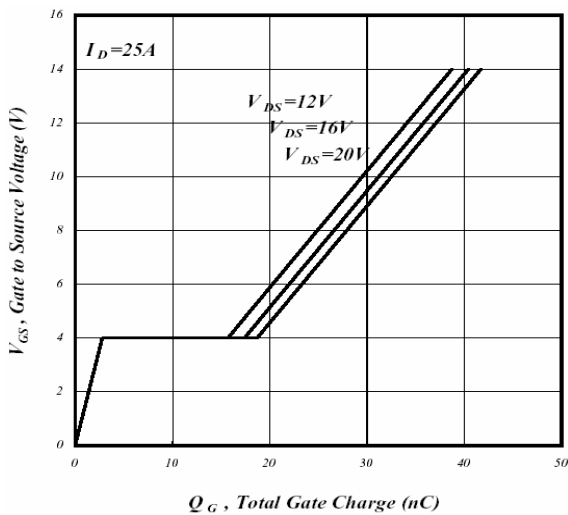v.s. Case Temperature**
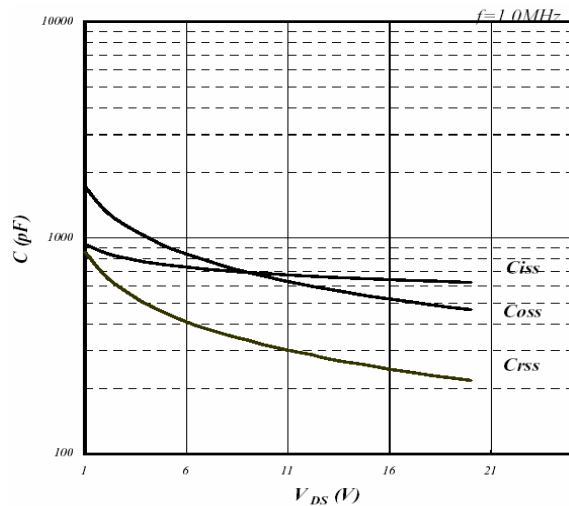

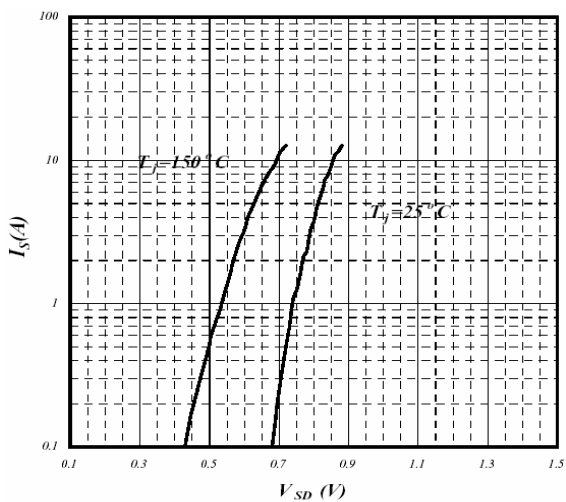**Fig 6. Type Power Dissipation**

Fig 7. Maximum Safe Operating Area

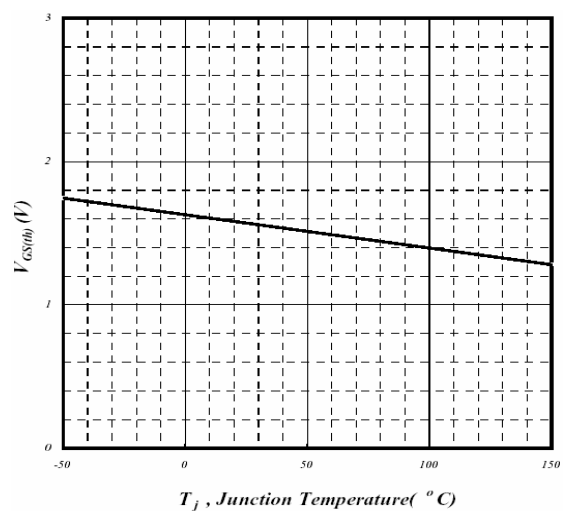**Fig 8. Effective Transient Thermal Impedance**
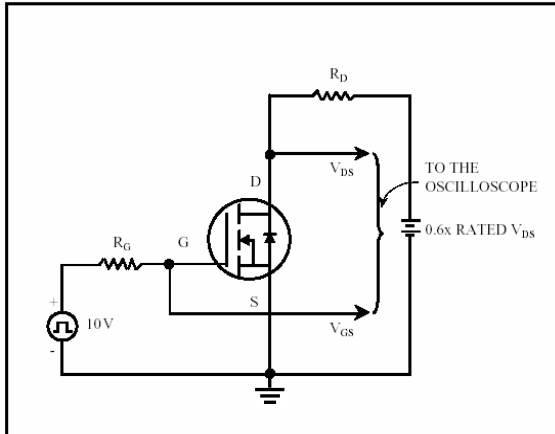

Fig 9. Gate Charge Characteristics

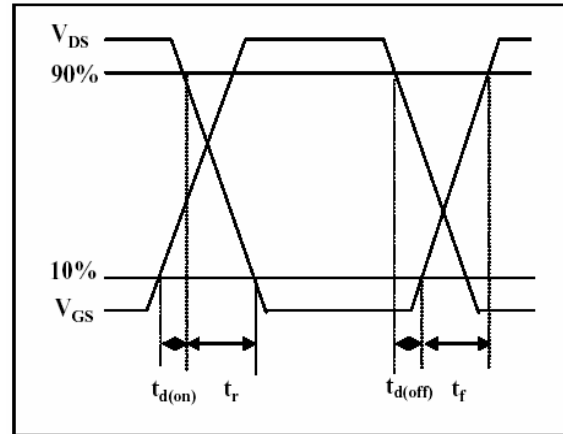**Fig 10. Typical Capacitance Characteristics**

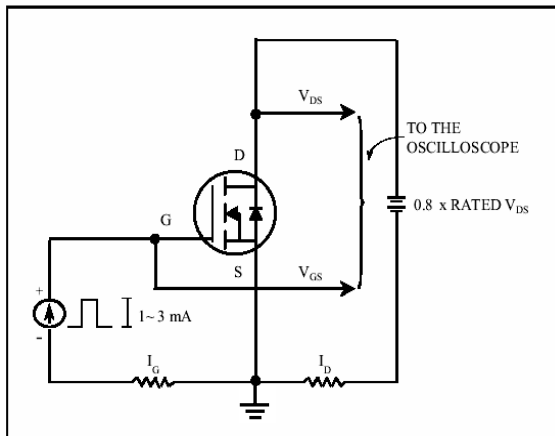**Fig 11. Forward Characteristics of
Reverse Diode**

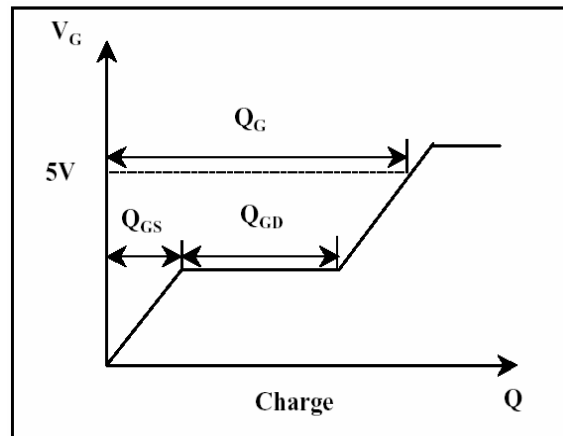**Fig 12. Gate Threshold Voltage v.s.
Junction Temperature**

Fig 13. Switching Time Circuit   **Fig 14. Switching Time Waveform**

Fig 15. Gate Charge Circuit   **Fig 16. Gate Charge Waveform**