HUABAN

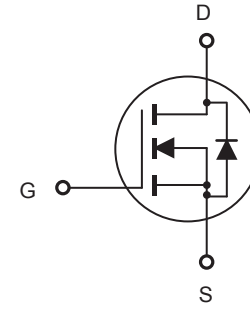
HB60N20F

N-Channel Enhancement Mode Field Effect Transistor

FEATURES

- 20V, 4.2A, $R_{DS(ON)}$ = 45mΩ @V_{GS} = 4.5V.
  $R_{DS(ON)}$ = 80mΩ @V_{GS} = 2.5V.
- High dense cell design for extremely low $R_{DS(ON)}$.
- Lead free product is acquired.
- Rugged and reliable.
- SOT-23 package.

SOT-23



ABSOLUTE MAXIMUM RATINGS T_A = 25°C unless otherwise noted

Parameter	Symbol	Limit	Units
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	4.2	A
Drain Current-Pulsed [a]	I_{DM}	16	A
Maximum Power Dissipation	P_D	1.25	W
Operating and Store Temperature Range	T_J,T_{stg}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Ambient [b]	$R_{\theta JA}$	100	°C/W

Electrical Characteristics T_A = 25℃ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
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} = 16V, V_{GS} = 0V			1	μA
Gate Body Leakage Current, Forward	I_{GSSF}	V_{GS} = 12V, V_{DS} = 0V			100	nA
Gate Body Leakage Current, Reverse	I_{GSSR}	V_{GS} = -12V, V_{DS} = 0V			-100	nA
On Characteristics [c]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250μA	0.5		1.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 4.5V, I_D = 4.2A		35	45	mΩ
		V_{GS} = 2.5V, I_D = 3.6A		50	80	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 10V, I_D = 4.0A		8		S
Dynamic Characteristics [d]						
Input Capacitance	C_{iss}	V_{DS} = 8V, V_{GS} = 0V, f = 1.0 MHz		500		pF
Output Capacitance	C_{oss}			300		pF
Reverse Transfer Capacitance	C_{rss}			140		pF
Switching Characteristics [d]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10V, I_D = 1A, □ V_{GS} = 4.5V, R_{GEN} = 6Ω		20	40	ns
Turn-On Rise Time	t_r			18	40	ns
Turn-Off Delay Time	$t_{d(off)}$			60	108	ns
Turn-Off Fall Time	t_f			28	56	ns
Total Gate Charge	Q_g	V_{DS} = 10V, I_D = 4.2A, V_{GS} = 4.5V		10	15	nC
Gate-Source Charge	Q_{gs}			2.3		nC
Gate-Drain Charge	Q_{gd}			2.9		nC
Drain-Source Diode Characteristics and Maximun Ratings						
Drain-Source Diode Forward Current [b]	I_S				1.3	A
Drain-Source Diode Forward Voltage [c]	V_{SD}	V_{GS} = 0V, I_S = 1.3A			1.2	V

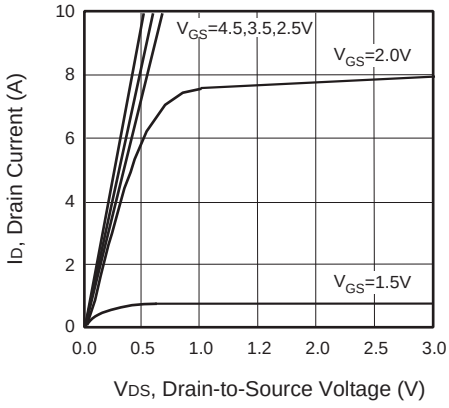


Figure 1. Output Characteristics

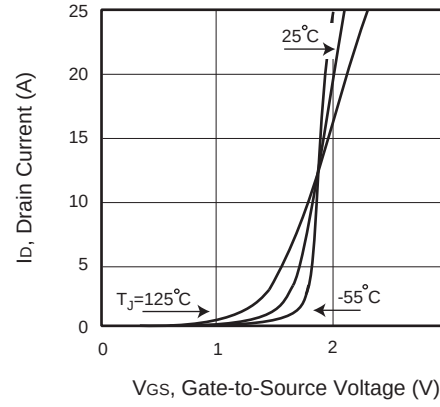


Figure 2. Transfer Characteristics

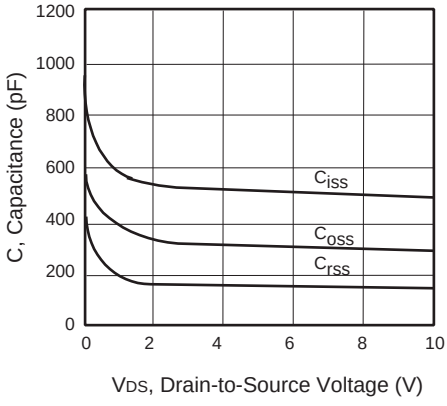


Figure 3. Capacitance

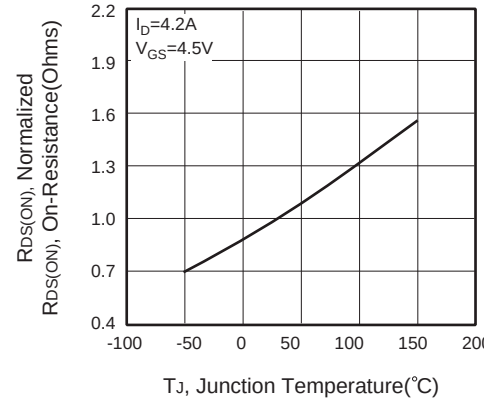


Figure 4. On-Resistance Variation with Temperature

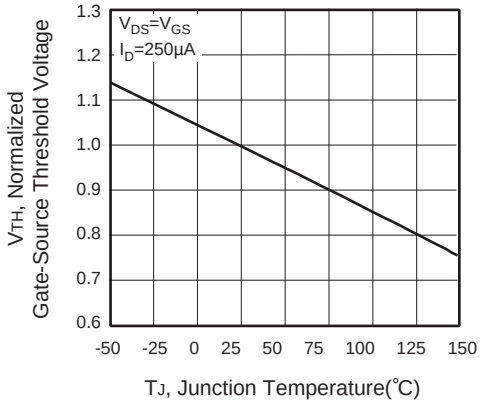


Figure 5. Gate Threshold Variation with Temperature

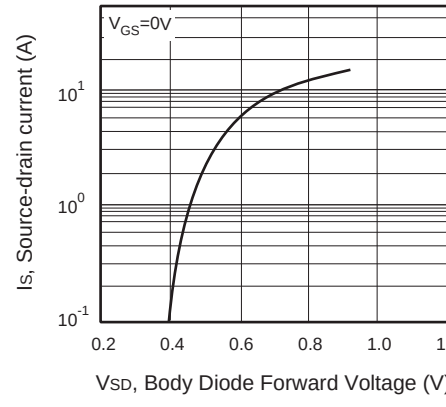


Figure 6. Body Diode Forward Voltage Variation with Source Current

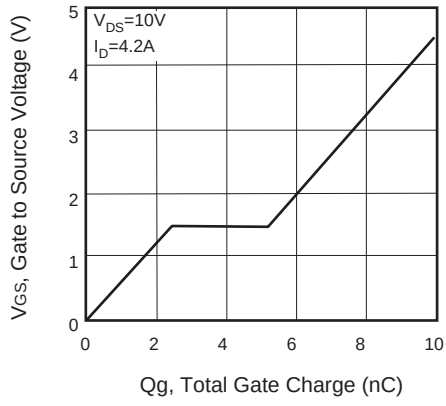


Figure 7. Gate Charge

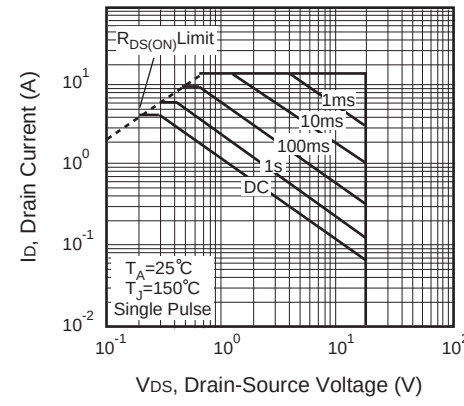


Figure 8. Maximum Safe Operating Area

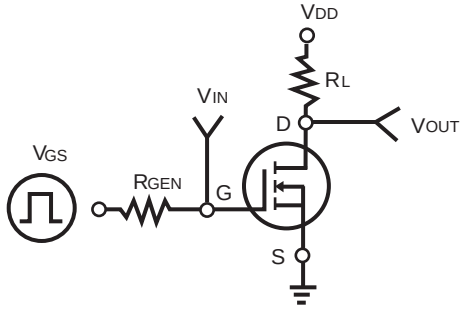


Figure 9. Switching Test Circuit

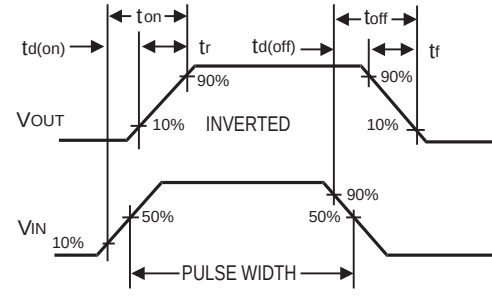
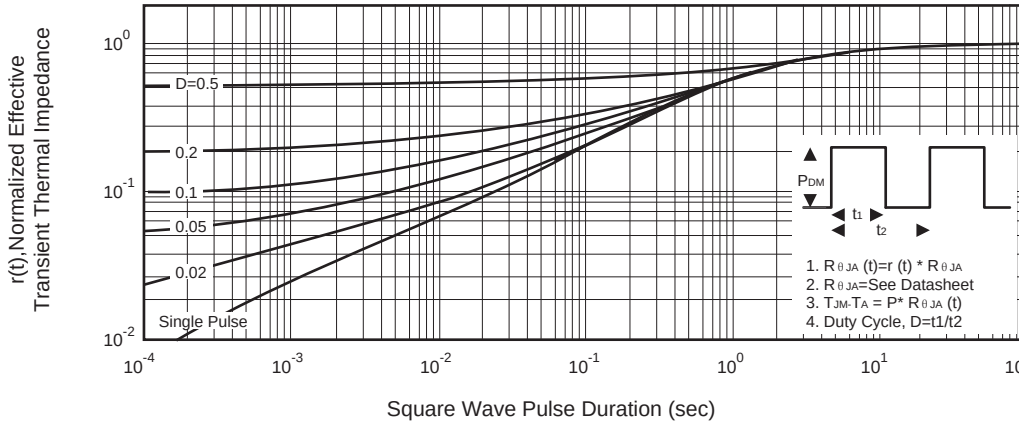



Figure 10. Switching Waveforms