

$$BV_{DSS} = 650 \text{ V}$$

$$R_{DS(on) \text{ typ}} \text{ MÁÁGÈHÁ}$$

$$I_D = 4.5 \text{ A}$$

Originative New Design
Superior Avalanche Rugged Technology

Package Marking and Odering Information

Device Marking	Week Marking	Package	Packing	Quantity	RoHS Status
HFS5N65U	YWWX	TO-220F(A)	Tube	50	Pb Free
HFS5N65US	YWWX	TO-220F(B)	Tube	50	Pb Free
HFS5N65U	YWWXg	TO-220F(A)	Tube	50	Halogen Free
HFS5N65US	YWWXg	TO-220F(B)	Tube	50	Halogen Free

※ TO-220F(A) : Dual Gauge, TO-220F(B) : Single Gauge

Electrical Characteristics $T_C=25\text{ }^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
V_{GS}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5	--	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.25\text{ A}$	--	2.3	2.9	δ

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	650	--	--	V
BV_{DSS} / T_J	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to $25\text{ }^\circ\text{C}$	--	0.6	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 520\text{ V}, T_C = 125\text{ }^\circ\text{C}$	--	--	10	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	± 100	nA

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	600	780	pF
C_{oss}	Output Capacitance		--	60	78	pF
C_{rss}	Reverse Transfer Capacitance		--	7.7	10	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Time	$V_{DS} = 325\text{ V}, I_D = 4.5\text{ A},$ $R_G = 25\text{ }\delta$	--	22	44	ns
t_r	Turn-On Rise Time		--	40	80	ns
$t_{d(off)}$	Turn-Off Delay Time		--	45	90	ns
t_f	Turn-Off Fall Time		(Note 4,5)	--	35	70
Q_g	Total Gate Charge	$V_{DS} = 520\text{ V}, I_D = 4.5\text{ A},$ $V_{GS} = 10\text{ V}$	--	10.5	13.5	nC
Q_{gs}	Gate-Source Charge		--	3.5	--	nC
Q_{gd}	Gate-Drain Charge		(Note 4,5)	--	3	--

Source-Drain Diode Maximum Ratings and Characteristics

I_S	Continuous Source-Drain Diode Forward Current	--	--	4.5	A	
I_{SM}	Pulsed Source-Drain Diode Forward Current	--	--	18		
V_{SD}	Source-Drain Diode Forward Voltage	$I_S = 4.5\text{ A}, V_{GS} = 0\text{ V}$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$I_S = 4.5\text{ A}, V_{GS} = 0\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	243	--	ns
Q_{rr}	Reverse Recovery Charge		--	1.5	--	δ

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L=14.8\text{ mH}, I_{AS}=4.5\text{ A}, V_{DD}=50\text{ V}, R_G=25\text{ }\delta$, Starting $T_J=25\text{ }^\circ\text{C}$
3. $I_{SD}4.5\text{ A}, di/dtmG\text{€€€€} \bullet, V_{DD}m\text{O}X_{DSS}$, Starting $T_J=25\text{ }^\circ\text{C}$
4. Pulse Test : Pulse Width $m\text{H}\text{€€} \bullet\text{€}\text{O}^\circ\text{c}^\circ\text{A}\text{O}^\circ\text{A}\text{m}\text{G}\text{A}$
5. Essentially Independent of Operating Temperature

Typical Characteristics

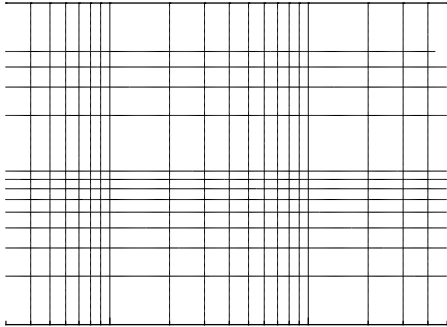


Figure 1. On Region Characteristics

Figure 2. Transfer Characteristics

Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

Fig 12. Gate Charge Test Circuit & Waveform

Fig 13. Resistive Switching Test Circuit & Waveforms

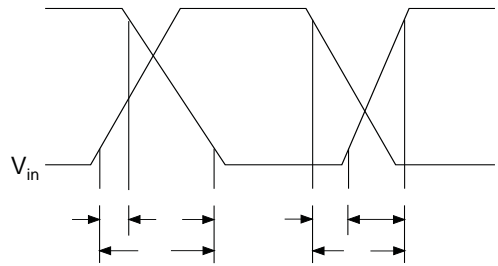
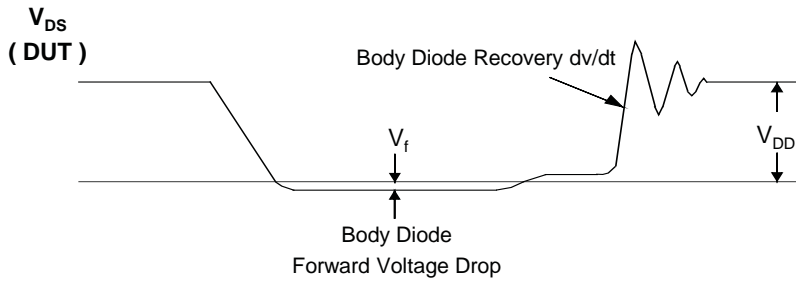
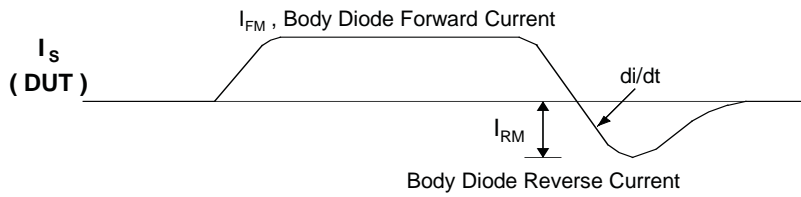
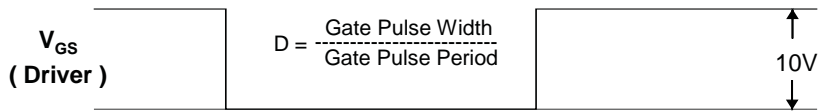
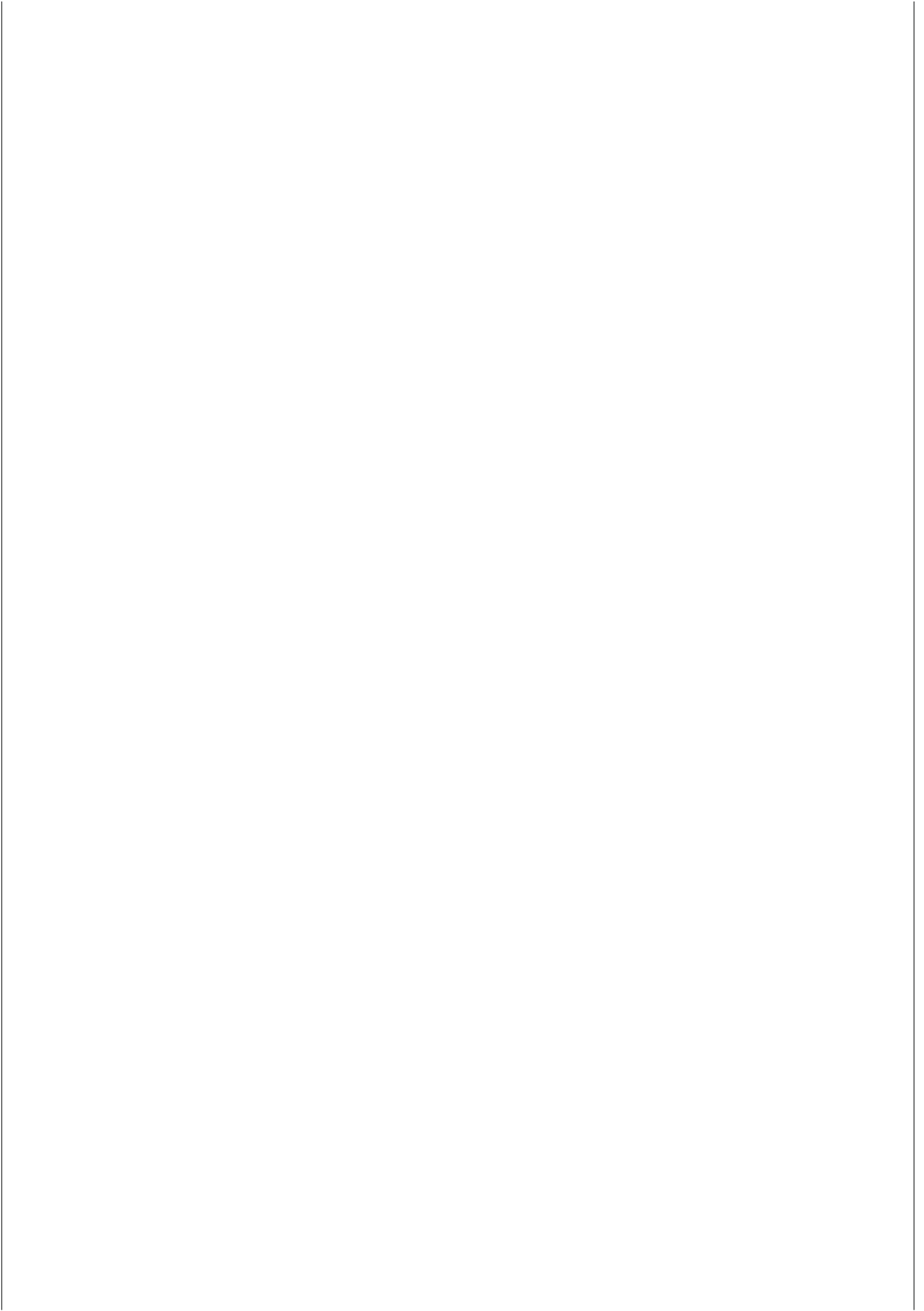


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

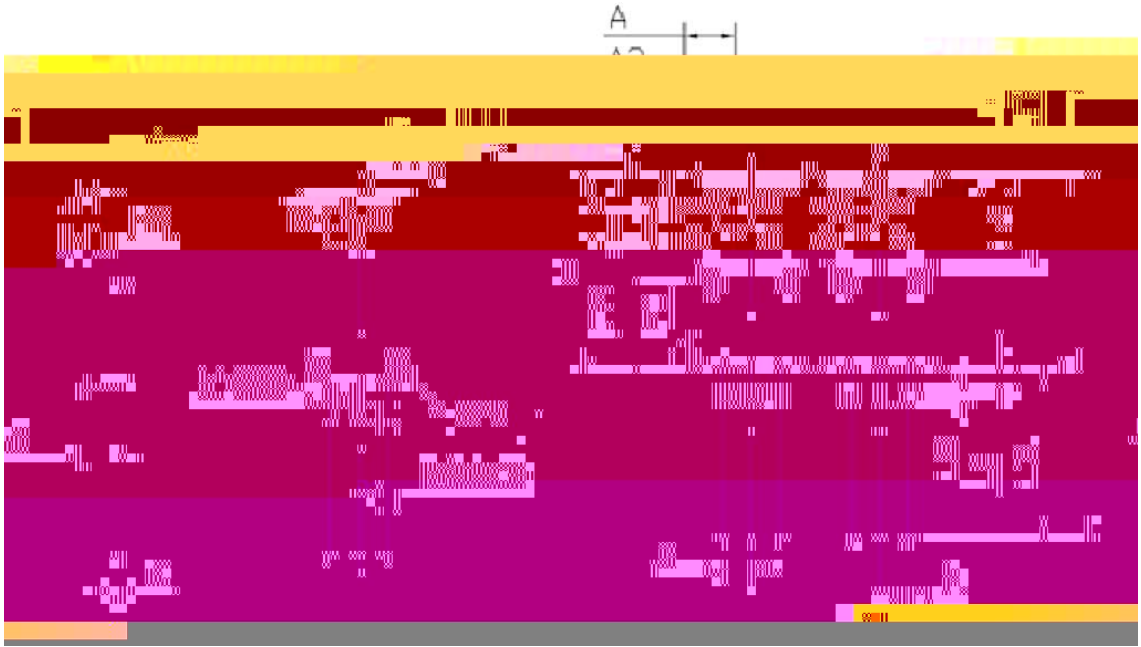
Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





Package Dimension

TO-220F (B)



Symbol	Dimensions In Millimeters		Dimensions In Inches		
	Min.	Max.	Min.	Max.	
A	4.300	4.700	0.169	0.185	
A1	1.300 REF.		0.051 REF.		
	0.020	0.030	b	0.500	
	0.045	0.051	b1	1.150	
	0.750	0.020	0.030	c	0.500
	0.583	0.598	E	14.800	
	0.106 REF.		F	2.700 REF.	
	0.248 REF.		F1	6.300 REF.	
	0.031 REF.		F2	2.200 REF.	
	0.020 REF.		h1	0.500 REF.	
	0.031 REF.		h2	0.800 REF.	
1.800	0.033	0.071	h3	1.400	
2.000	0.047	0.079	I.2	1.200	
13.8	0.512	0.543	I.3	13.0	
	0.276 REF.		I.4	7.000 REF.	