



N-Channel Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY

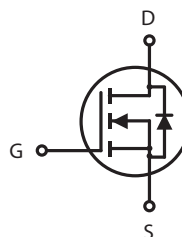
V _{DSS}	I _D	R _{DS(ON)} (mΩ) Max
60V	12A	75 @ V _{GS} =10V
		105 @ V _{GS} =4.5V

FEATURES

- Super high dense cell design for low R_{DS(ON)}.
- Rugged and reliable.
- TO-220F Package.



STF SERIES
TO-220F



ABSOLUTE MAXIMUM RATINGS (T_C=25°C unless otherwise noted)

Symbol	Parameter		Limit	Units
V _{DS}	Drain-Source Voltage		60	V
V _{GS}	Gate-Source Voltage		±20	V
I _D	Drain Current-Continuous ^a	T _C =25°C	12	A
		T _C =70°C	9.6	A
I _{DM}	-Pulsed ^b		36	A
E _{AS}	Avalanche Energy ^d		30	mJ
P _D	Maximum Power Dissipation ^a	T _C =25°C	21	W
		T _C =70°C	13.3	W
T _J , T _{STG}	Operating Junction and Storage Temperature Range		-55 to 150	°C

THERMAL CHARACTERISTICS

R _{θJC}	Thermal Resistance, Junction-to-Case ^a	6	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient ^a	65	°C/W

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ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V , V _{GS} =0V			1	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±20V , V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	1	2	3	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V , I _D =6A		62	75	m ohm
		V _{GS} =4.5V , I _D =5A		80	105	m ohm
g _{FS}	Forward Transconductance	V _{DS} =5V , I _D =6A		14.8		S
DYNAMIC CHARACTERISTICS ^c						
C _{ISS}	Input Capacitance	V _{DS} =20V,V _{GS} =0V f=1.0MHz		982		pF
C _{OSS}	Output Capacitance			57		pF
C _{RSS}	Reverse Transfer Capacitance			46		pF
SWITCHING CHARACTERISTICS ^c						
t _{D(ON)}	Turn-On Delay Time	V _{DD} =30V I _D =1A V _{GS} =10V R _{GEN} = 6 ohm		19		ns
t _r	Rise Time			13.4		ns
t _{D(OFF)}	Turn-Off Delay Time			21.4		ns
t _f	Fall Time			17.3		ns
Q _g	Total Gate Charge	V _{DS} =30V,I _D =6A,V _{GS} =10V		16		nC
		V _{DS} =30V,I _D =6A,V _{GS} =4.5V		7.6		nC
Q _{gs}	Gate-Source Charge	V _{DS} =30V,I _D =6A, V _{GS} =10V		2.2		nC
Q _{gd}	Gate-Drain Charge			4		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I _S	Maximum Continuous Drain-Source Diode Forward Current				1.5	A
V _{SD}	Diode Forward Voltage ^b	V _{GS} =0V,I _S =1.5A		0.81	1.3	V

Notes

- Surface Mounted on FR4 Board, t ≤ 10sec.
- Pulse Test: Pulse Width ≤ 300us, Duty Cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.
- Starting T_J=25°C, L=0.5mH, V_{DD} = 30V. (See Figure13)

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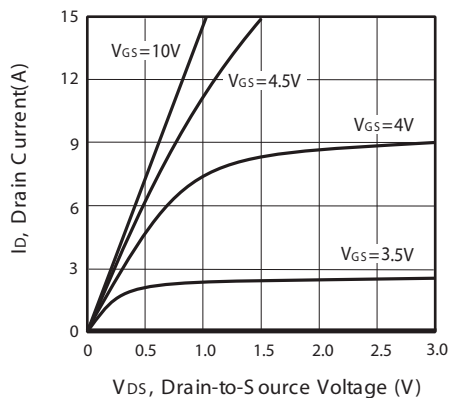


Figure 1. Output Characteristics

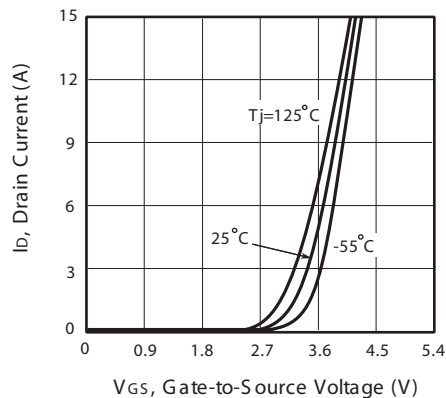


Figure 2. Transfer Characteristics

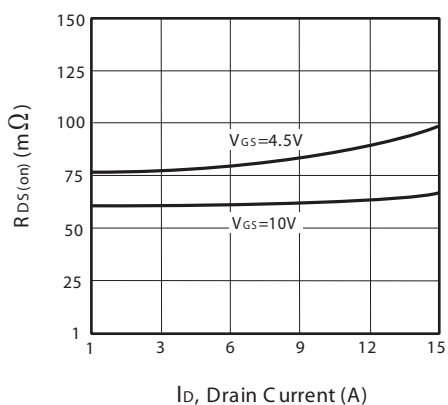


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

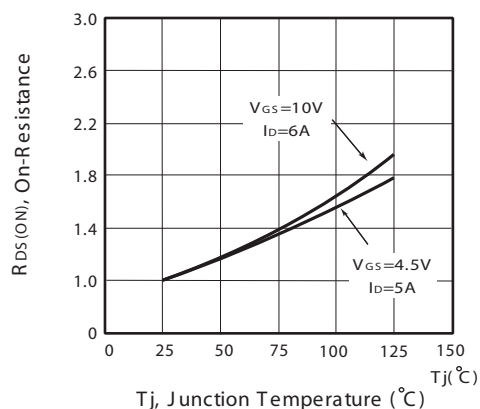


Figure 4. On-Resistance Variation with Drain Current and Temperature

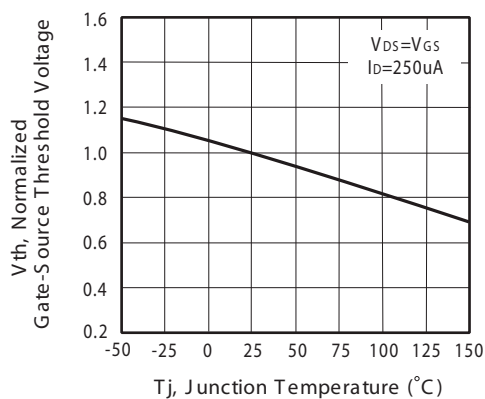


Figure 5. Gate Threshold Variation with Temperature

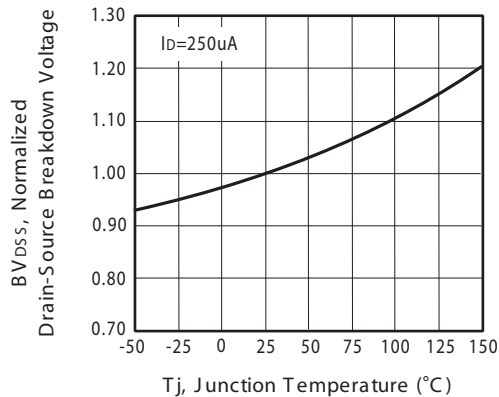


Figure 6. Breakdown Voltage Variation with Temperature

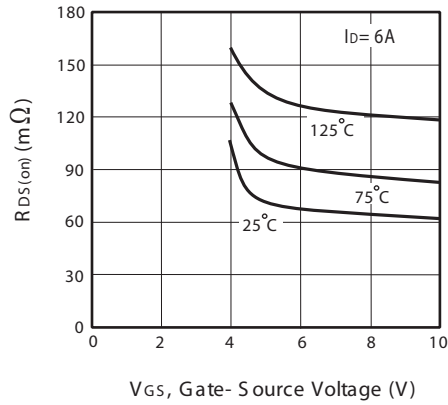


Figure 7. On-Resistance vs. Gate-Source Voltage

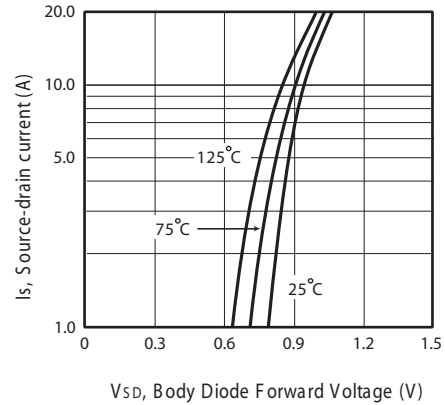


Figure 8. Body Diode Forward Voltage Variation with Source Current

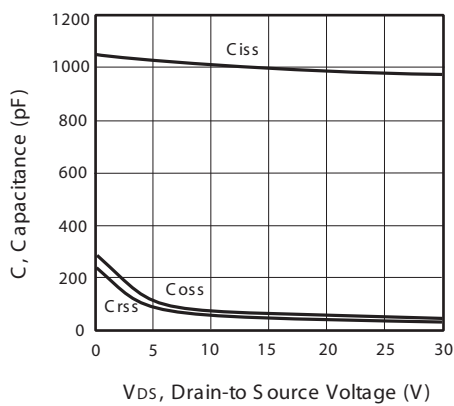


Figure 9. Capacitance

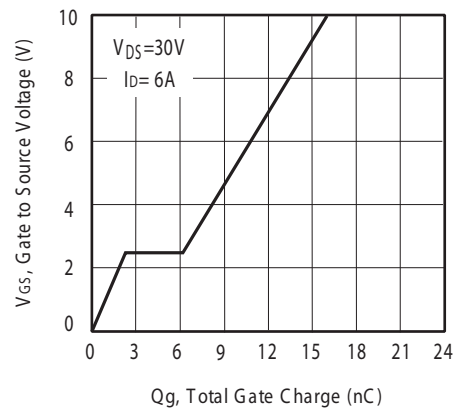


Figure 10. Gate Charge

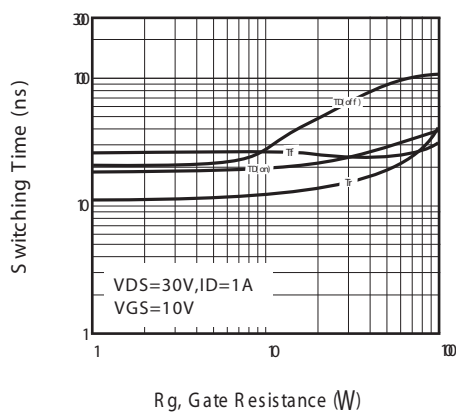


Figure 11. Switching characteristics

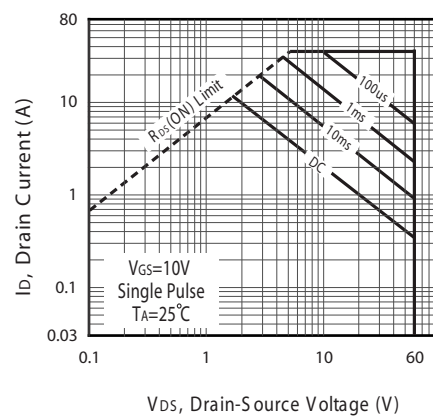
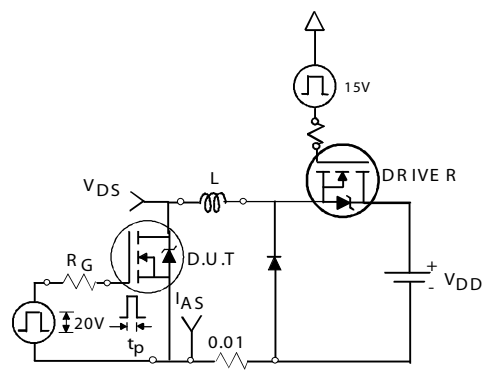
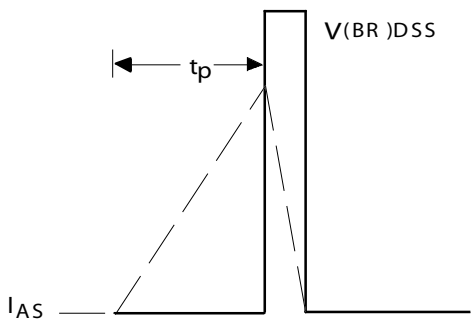


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

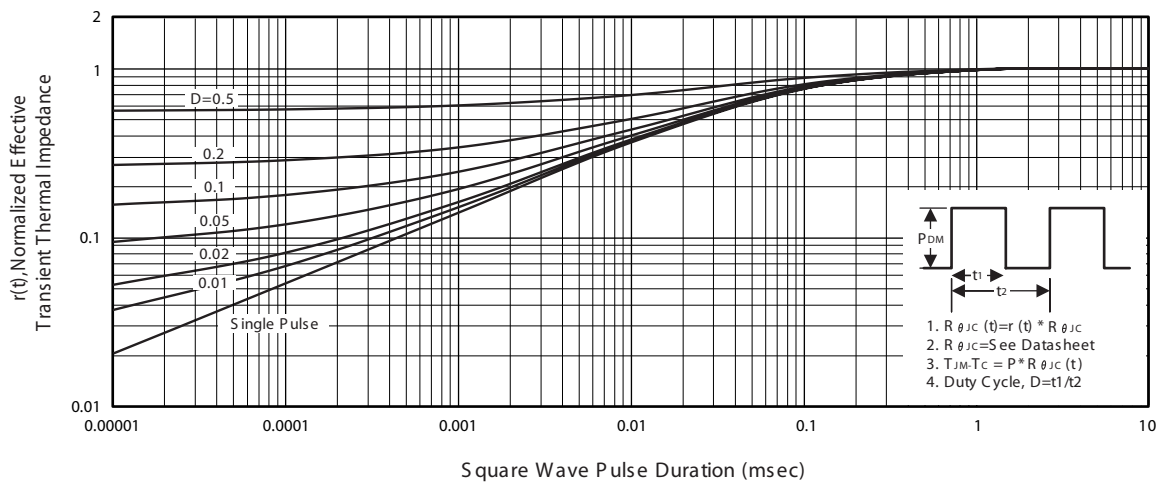


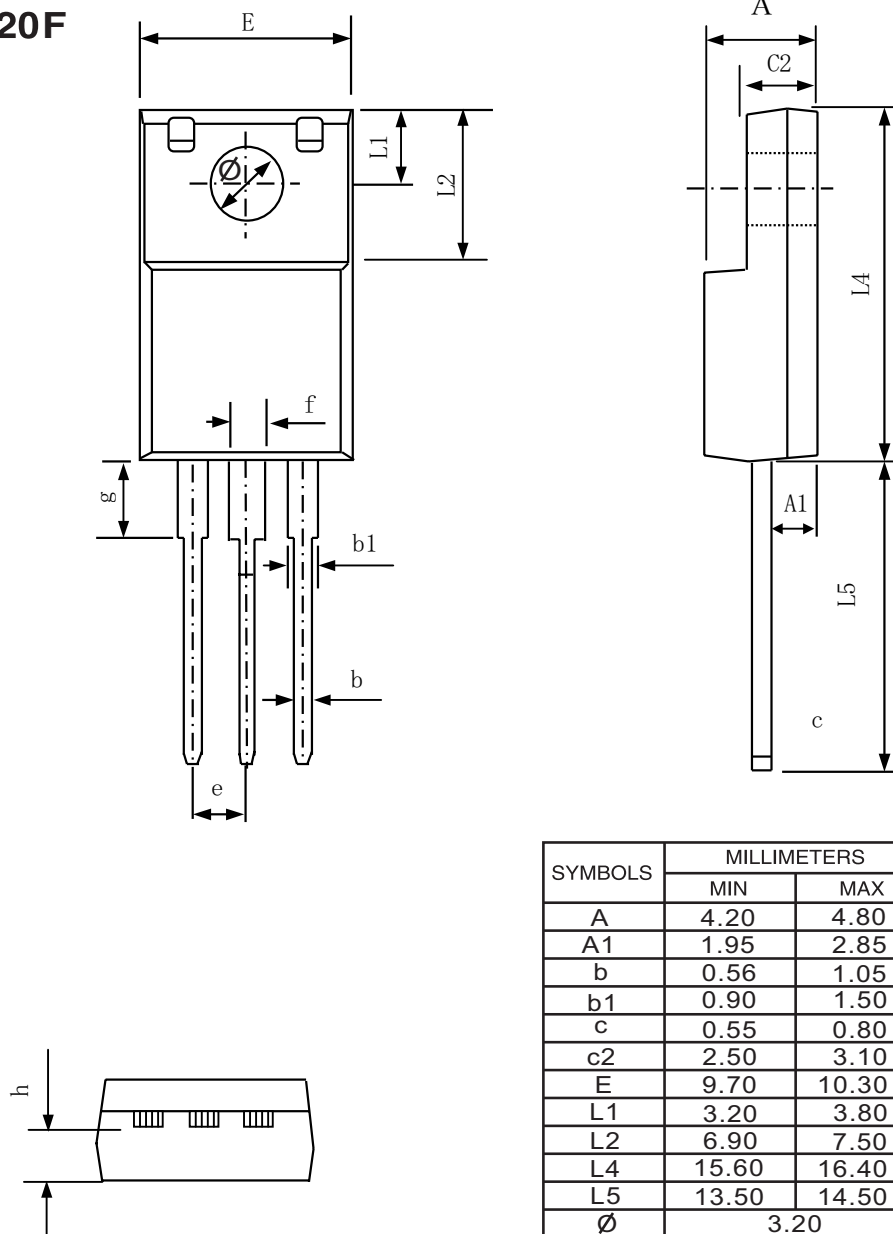
Figure 14. Normalized Thermal Transient Impedance Curve

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PACKAGE OUTLINE DIMENSIONS

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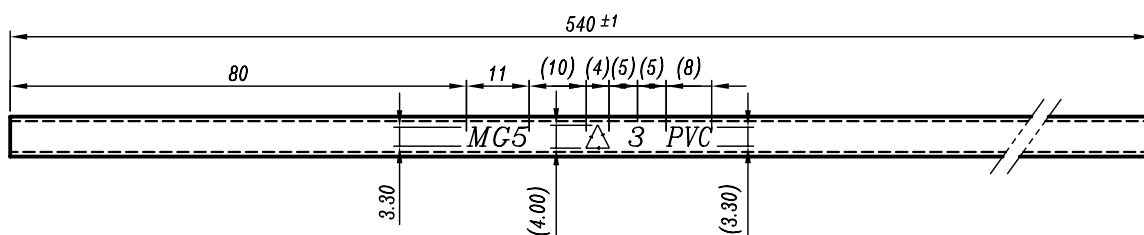
SYMBOLS	MILLIMETERS	
	MIN	MAX
A	4.20	4.80
A1	1.95	2.85
b	0.56	1.05
b1	0.90	1.50
c	0.55	0.80
c2	2.50	3.10
E	9.70	10.30
L1	3.20	3.80
L2	6.90	7.50
L4	15.60	16.40
L5	13.50	14.50
$\varnothing$	3.20	
e	2.55	
f	1.30	1.90
g	3.40	3.80
h	2.10	2.70

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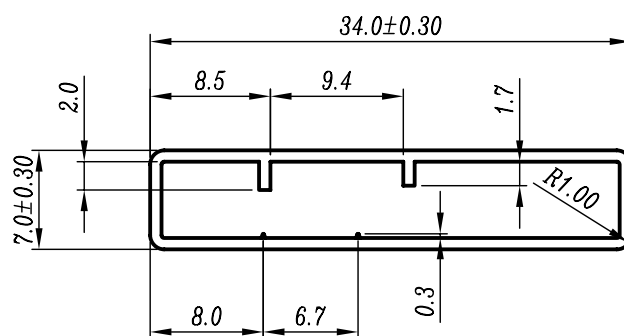
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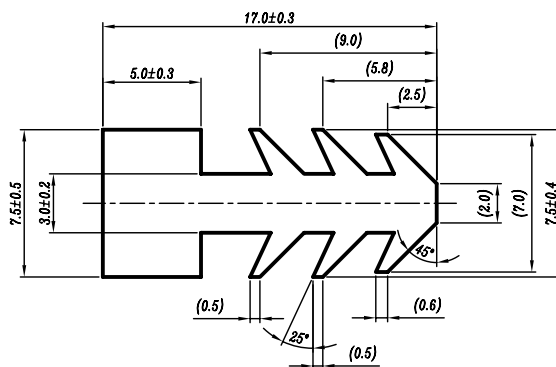
TO-220F Tube



$$t = 0.8 \pm 0.15$$



$$SCALE = 2/1$$



$$L = 8.0 \pm 0.5$$

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