



80A 100V N-CANNEL POWER MOSFET

TO-220F-3L(*Prefix :F)

Description

This model is an advanced SGT MOSFET with better characteristics, such as fast switching time, low gate charge and low on state resistance.

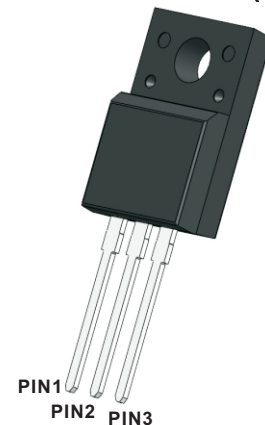
Such enhanced MOSFET are commonly used in switching p supplies and adapters for high-speed switching application:

Features

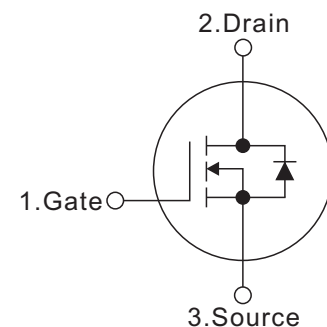
- SGT technology
- $R_{DS(ON)} < 8.7m\Omega @ V_{GS}=10V, I_D=50A$
- Extremely low on impedance
- Low gate charge
- Superior switching characteristics
- 100% Avalanche tested
- 100% ΔV_{DS} tested

Mechanical data

- Case: TO-220F-3L
- Approx Weight: 1.767g (0.062oz)
- Lead free finish, RoHS compliant
- Case Material: "Green" molding compound, UL flammability classification 94V-0, "Halogen-free"



ROHS
COMPLIANT



Absolute Maximum Ratings (ta=25°C, Unless Otherwise Specified)

Parameter	Symbols	Ratings	Units
Drain-Source Voltage	V_{DSS}	100	V
Gate-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current $T_c=25^\circ C$	I_D	80	A
Pulsed Drain Current (Note 2)	I_{DM}	320	A
Avalanche Energy Single Pulsed (Note 3)	E_{AS}	150	mJ
Power Dissipation (TA = 25°C, Steady State)	P_D	108	W
Operating junction and storage temperature	T_J, T_{STG}	-55 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. L=0.5mH, VDD = 50V, RG = 25 Ω , Starting TJ = 25°C

Thermal Resistance

Parameter	Symbols	Ratings	Units
Thermal resistance, junction – case.	R_{thJC}	1.15	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	60	°C/W



Electrical Characteristics (Ta=25°C, Unless Otherwise Specified)

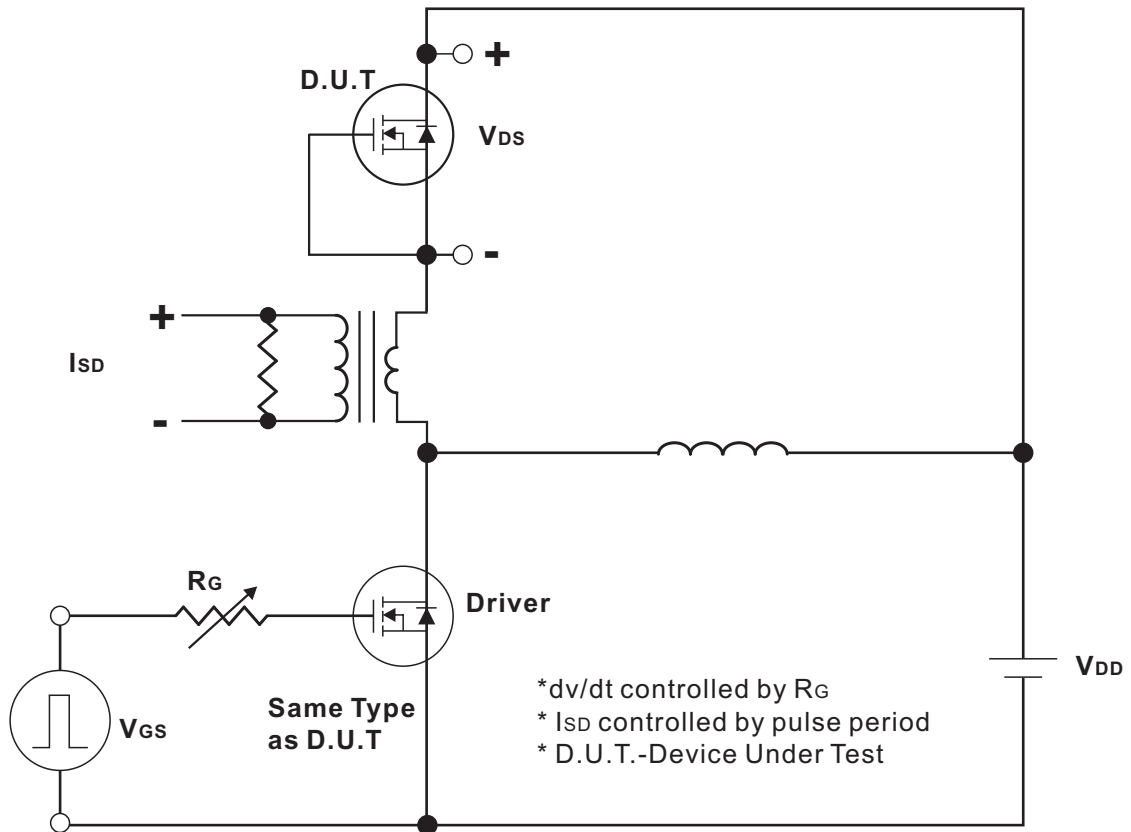
Parameter	Symbols	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=50A$		7.3	8.7	m Ω
Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$		44		S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=50V,$		1916		pF
Output Capacitance	C_{OSS}	$V_{GS}=0V,$		602		pF
Reverse Transfer Capacitance	C_{RSS}	$f=1.0MHz$		17		pF
Gate resistance	R_G			0.65		Ω
Switching Characteristics						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=50V, V_{GS}=10V,$		32.1		nC
Gate-Source Charge	Q_{GS}	$I_D=20A(NOTE1,2)$		9.7		nC
Gate-Drain Charge	Q_{GD}			8.6		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=50V, V_{GS}=10V,$		15		ns
Turn-On Rise Time	t_R	$R_G=4\Omega, I_D=20A$		23		ns
Turn-Off Delay Time	$t_{D(OFF)}$	(NOTE1,2)		45		ns
Turn-Off Fall Time	t_F			35		ns
Drain-source Diode Characteristics And Maximum Ratings						
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_{SD}=20A, V_{GS}=0V$			1.2	V
Diode continuous forward current	I_S				80	A
Reverse Recovery time	t_{rr}	$I_{SD}=20A$		60		nS
Reverse Recovery Charge	Q_{rr}	$di/dt=100A/us$		110		nC

Notes:

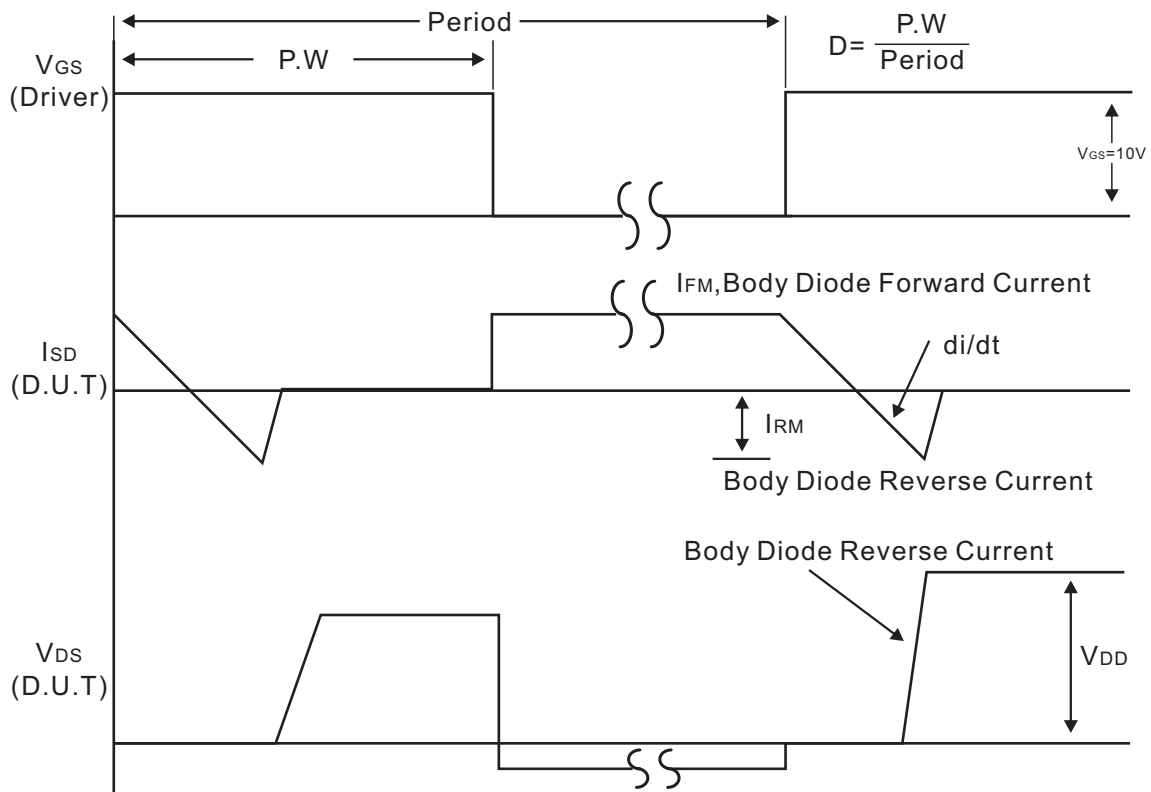
1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.



Test Circuits and waveforms



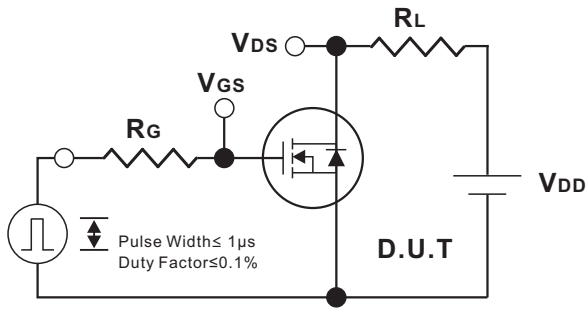
Peak Diode Recovery dv/dt Test Circuit



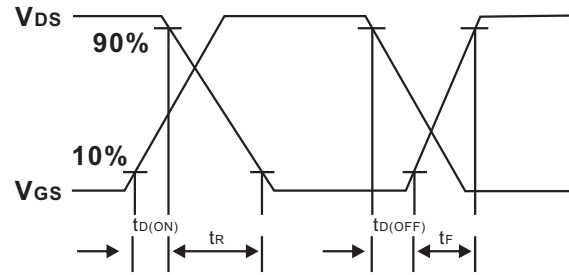
Body Diode Forward Voltage Drop
Peak Diode Recovery dv/dt Waveforms



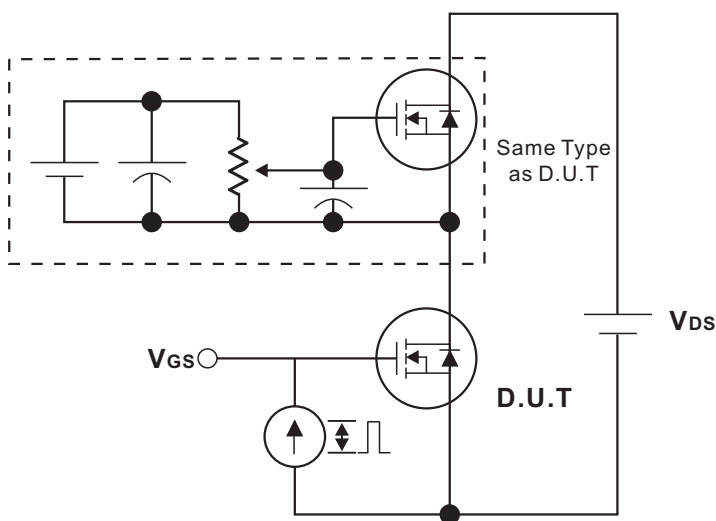
Test Circuits and waveforms



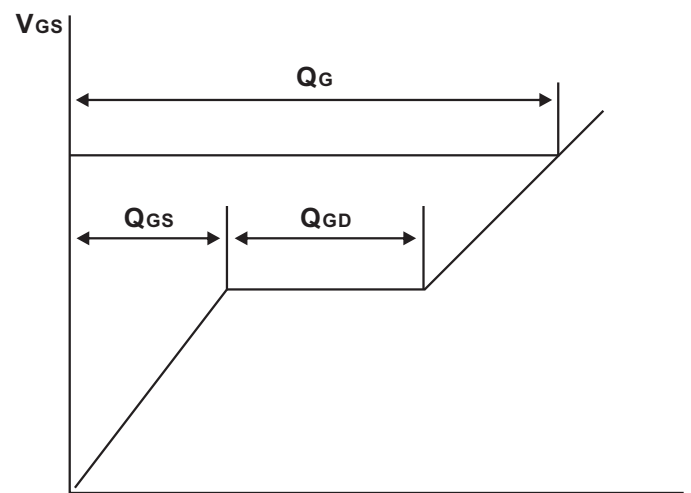
Switching Test Circuit



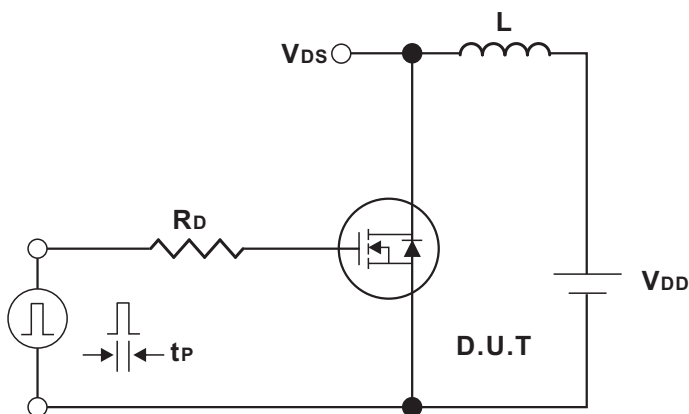
Switching Waveforms



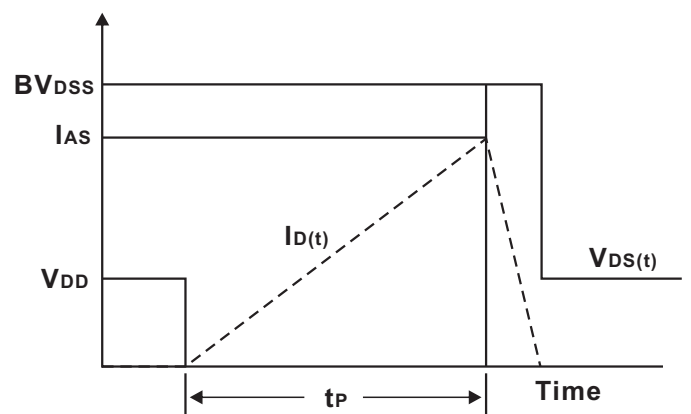
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



Typical Characteristics

Fig.1 Output characteristics

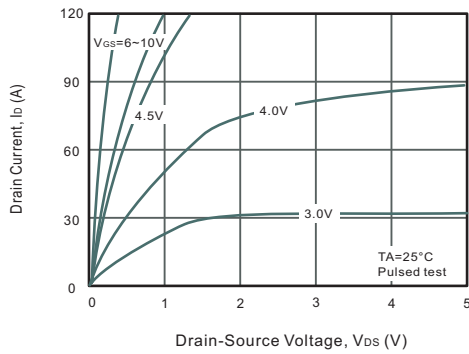


Fig.2 Power Dissipation

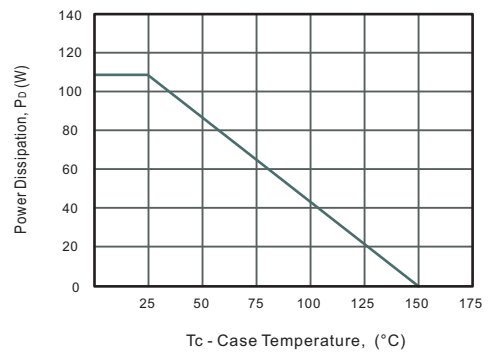


Fig.3 Drain Current Derating

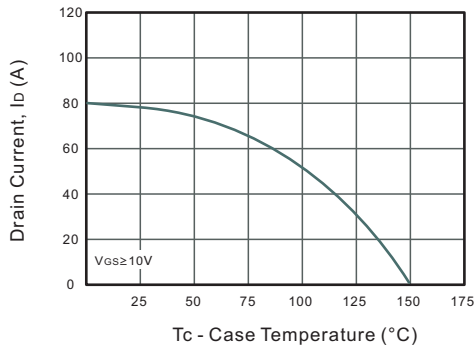


Fig.4 Drain-Source On-Resistance vs. Drain Current

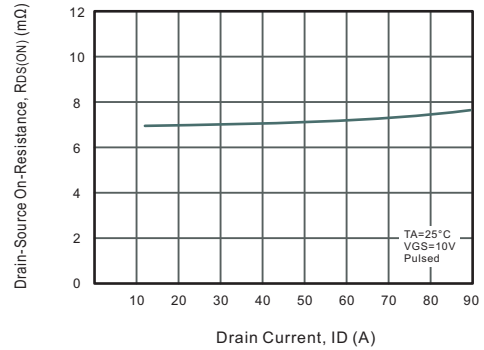


Fig.5 Gate Threshold Voltage vs. Junction Temperature

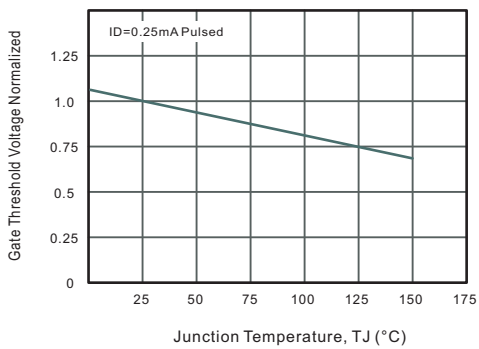


Fig.6 Body-diode Forward Characteristics

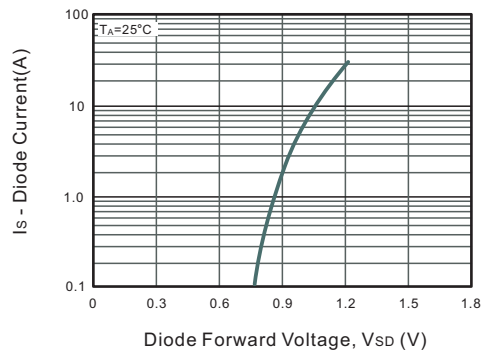


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

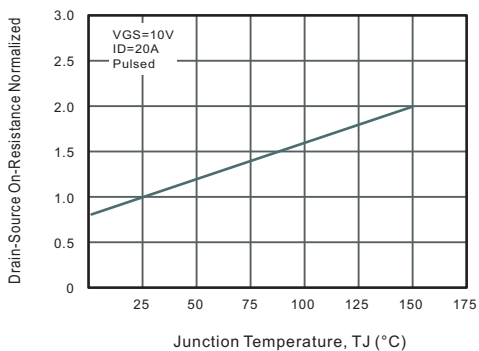
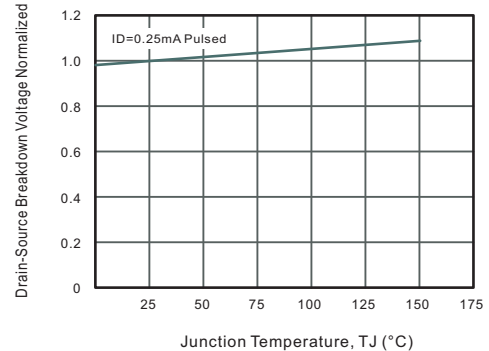


Fig.8 Breakdown Voltage vs. Junction Temperature





Typical Characteristics

Fig.9 Capacitance Characteristics

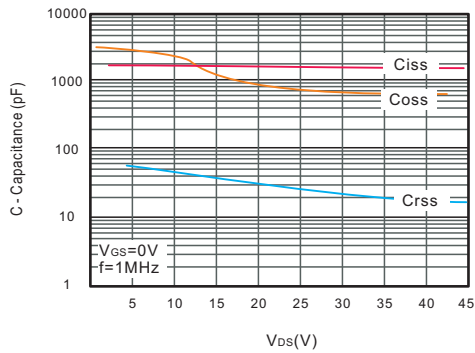


Fig.10 Gate Charge Characteristics

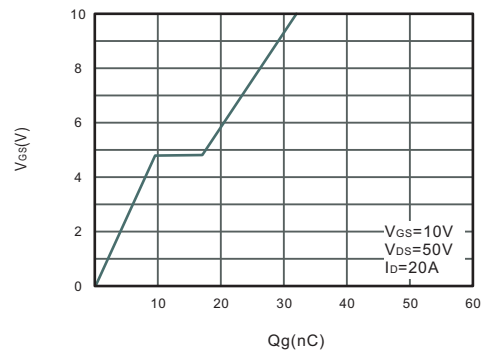


Fig.11 Safe Operating Area

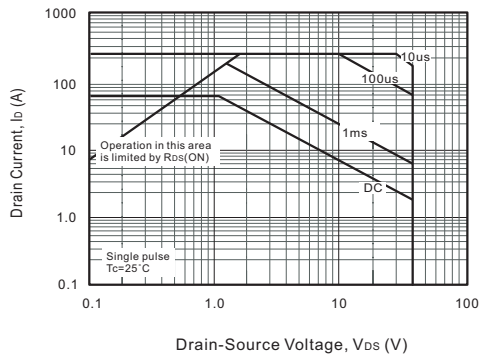
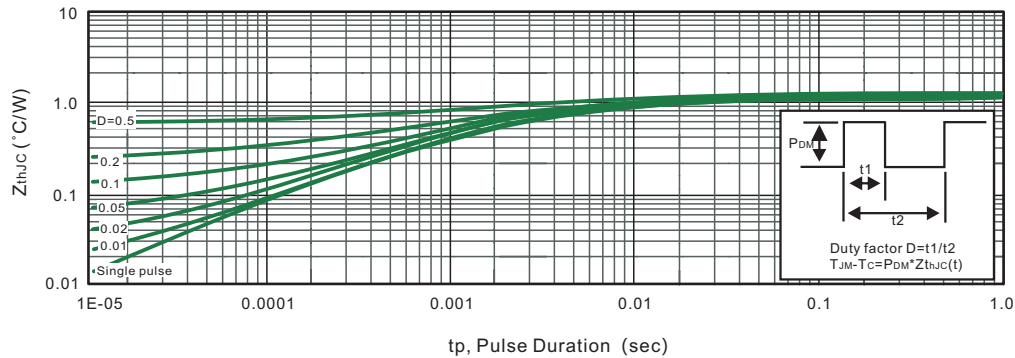


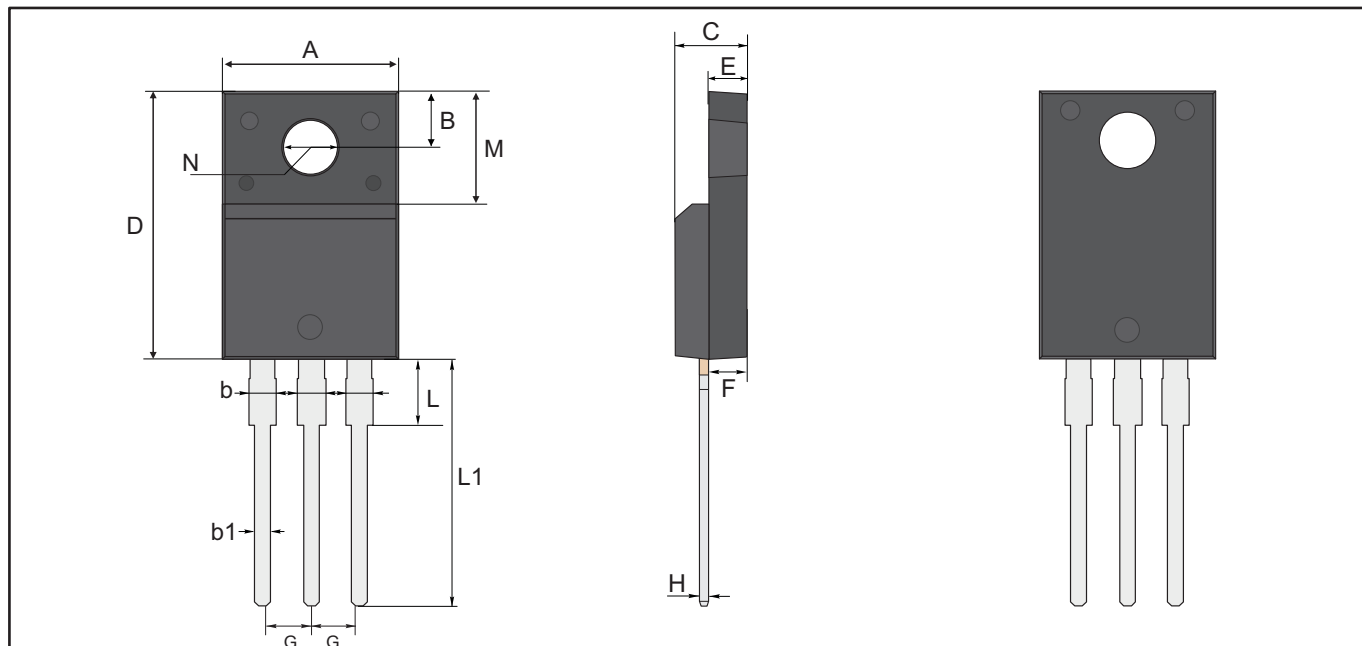
Fig.12 Max. Transient Thermal Impedance





Package Outline
Through Hole Package ; 3 leads

TO-220F-3L



TO-220F-3L Mechanical data

UNIT		A	B	b	b1	C	D	E	F	G	H	L	L1	M	N
mm	max	10.28	3.37	1.44	0.9	4.9	16.07	2.74	2.74	2.64	0.6	2.85	13.7	6.98	3.18 typ.
	typ	10.18	3.27	1.34	0.8	4.7	15.87	2.54	2.54	2.54	0.5	2.65	13.5	6.68	
	min	10.08	3.17	1.24	0.7	4.5	15.67	2.34	2.34	2.44	0.4	2.45	13.3	6.38	
mil	max	405	133	57	35	193	633	108	108	104	24	112	539	275	125 typ.
	typ	401	129	53	31	185	625	100	100	100	20	104	531	263	
	min	397	125	49	28	177	617	92	92	96	16	96	524	251	

Marking

Type number	Marking code
F7R3NS100HQ	F7R3NS100HQ



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