Features

- Low Gate Charge
- Low ON Resistance
- Improved dv/dt Capability
- 100% Avalanche Tested
- RoHS compliant

Product Summary

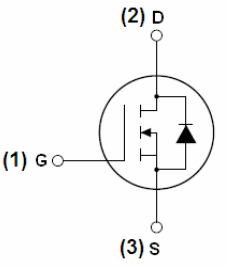
RoHs

V_{DS}	650	V
$R_{DS(on),Typ}$@ V_{GS}=10 V	0.65	Ω
I_D	12	A

Applications

- Switching Mode Power Supplies (SMPS)
- PWM Motor Controls
- AC to DC Converters
- LED Lighting
- Adapter

TO-220F



ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise noted)			
Parameter	Symbol	Limit	Unit
		TO-220F	
Drain to Source Voltage	V_{DS}	650	V
Continuous Drain Current (@T_C=25°C)	I_D	12 (1)	A
Continuous Drain Current (@T_C=100°C)		7.5 (1)	A
Drain current pulsed (2)	I_{DM}	40 (1)	A
Gate to Source Voltage	V_{GS}	±30	V
Single pulsed Avalanche Energy (3)	E_{AS}	576	mJ
Peak diode Recovery dv/dt (4)	dv/dt	5	V/ns
Total power dissipation (@T_C=25°C)	P_D	24	W
Derating Factor above 25°C		0.19	W/°C
Operating Junction Temperature & Storage Temperature	T_{STG}, T_J	-55 to + 150	°C
Maximum lead temperature for soldering purpose	T_L	260	°C

Notes

1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. L = 8mH, I_{AS} = 12A, V_{DD} = 50V, R_G=25Ω, Starting at T_J = 25°C
4. I_{SD} ≤ I_D, di/dt = 100A/us, V_{DD} ≤ BV_{DSS}, Starting at T_J =25°C

THERMAL CHARACTERISTICS			
Parameter	Symbol	Value	Unit
		TO-220F	
Thermal resistance, Junction to case (Maximum)	R_{thjc}	2.1	°C/W
Thermal resistance, Junction to ambient (Maximum)	R_{thja}	62	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise specified)						
Parameter	**Symbol**	**Test conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Off Characteristics						
Drain to source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	650	--	--	V
Breakdown voltage temperature coefficient	ΔBV_{DSS} / ΔTJ	I_D=250uA, referenced to 25°C	--	0.65	--	V/°C
Drain to source leakage current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	--	--	1	uA
		V_{DS}=520V, T_C=125°C	--	--	50	uA
Gate to source leakage current, forward	I_{GSS}	V_{GS}=30V, V_{DS}=0V	--	--	100	nA
Gate to source leakage current, reverse		V_{GS}=-30V, V_{DS}=0V	--	--	-100	nA
On Characteristics						
Gate threshold voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	2.5	3.5	4.5	V
Drain to source on state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=6A	--	0.65	0.8	Ω
Forward Transconductance	Gfs	V_{DS}=30V, I_D=6A	--	9.6	--	S
Dynamic Characteristics						
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	--	1890	--	pF
Output capacitance	C_{oss}		--	144	--	
Reverse transfer capacitance	C_{rss}		--	9.9	--	
Turn on delay time	$t_{d(on)}$	V_{DS}=325V, I_D=12A , R_G=25Ω , V_{GS}=10V	--	33	--	ns
Rising time	tr		--	41	--	
Turn off delay time	$t_{d(off)}$		--	102	--	
Fall time	t_f		--	37	--	
Total gate charge	Q_g	V_{DS}=520V, V_{GS}=10V, I_D=12A	--	38	--	nC
Gate-source charge	Q_{gs}		--	9	--	
Gate-drain charge	Q_{gd}		--	13	--	
Gate Resistance	Rg	V_{DS}=0V, Scan F mode	--	1.4	--	Ω

SOURCE TO DRAIN DIODE RATINGS CHARACTERISTICS						
Parameter	**Symbol**	**Test conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Continuous source current	I_S	Integral reverse p-n Junction diode in the MOSFET	--	--	12	A
Pulsed source current	I_{SM}		--	--	48	A
Diode forward voltage drop.	V_{SD}	I_S=12A, V_{GS}=0V	--	--	1.3	V
Reverse recovery time	T_{rr}	I_S=12A, V_{GS}=0V, dI_F/dt=100A/us	--	480	--	ns
Reverse recovery Charge	Qrr		--	4.5	--	uC
Peak Reverse Recovery Current	Irrm	I_S=12A, dI_F/dt=100A/us	--	18.5	--	A

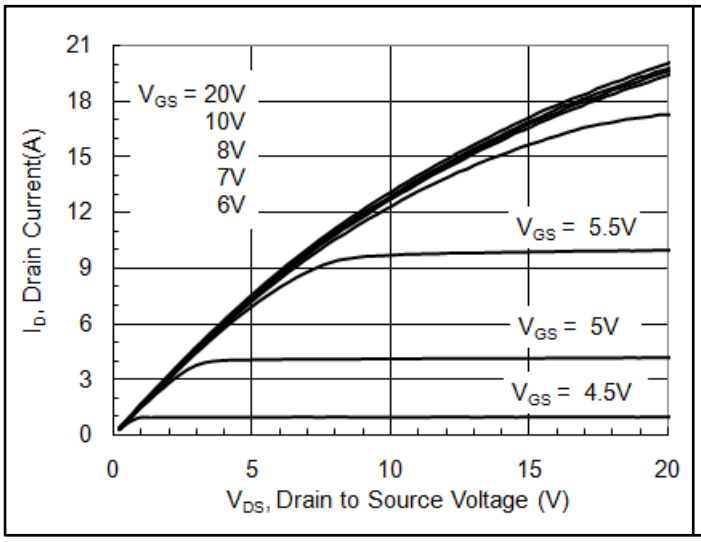


Fig1. Output characteristics

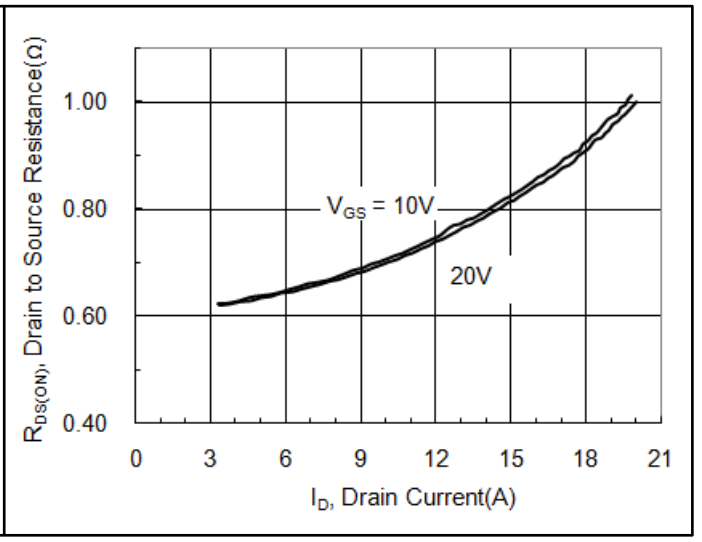


Fig2. Drain-source on-state resistance

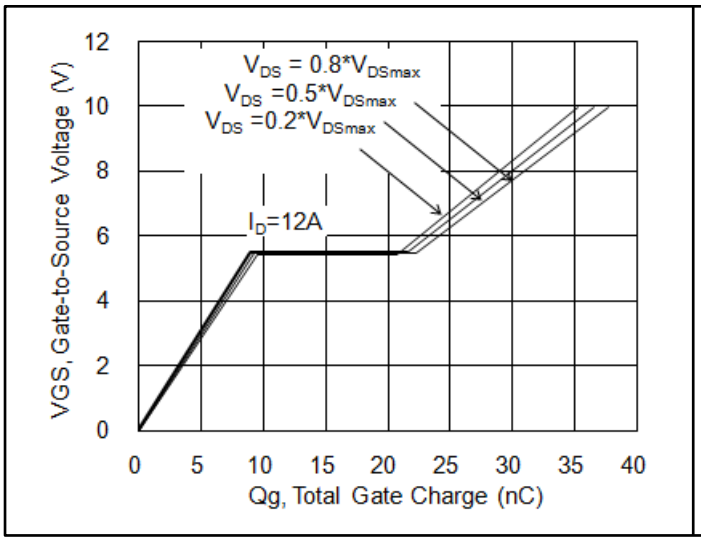


Fig3. Gate charge characteristics

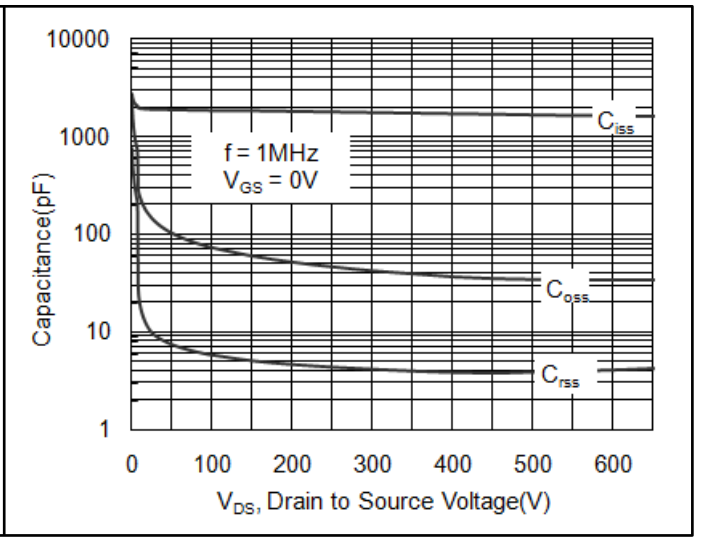


Fig 4. Capacitance Characteristics

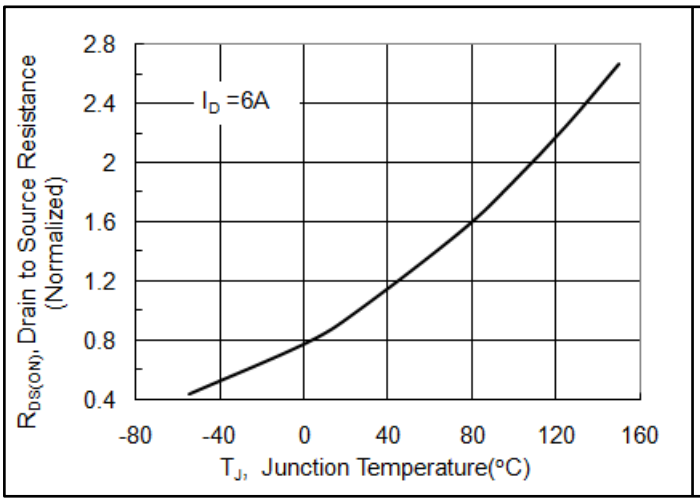


Fig 5. $R_{DS(ON)}$ vs junction temperature

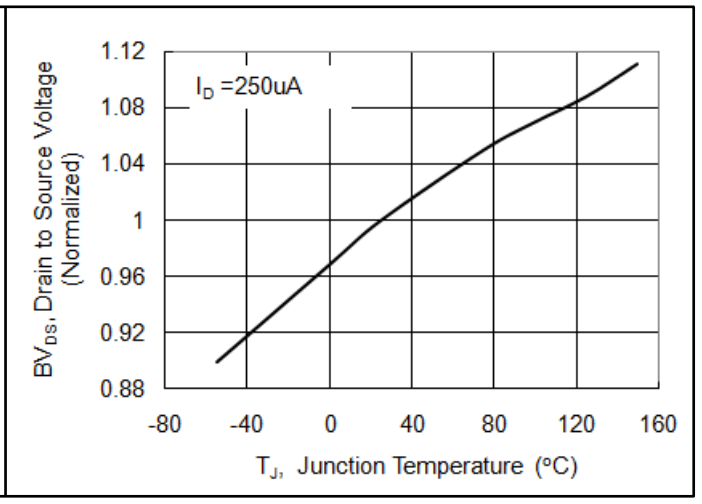


Fig 6. BV_{DSS} vs junction temperature

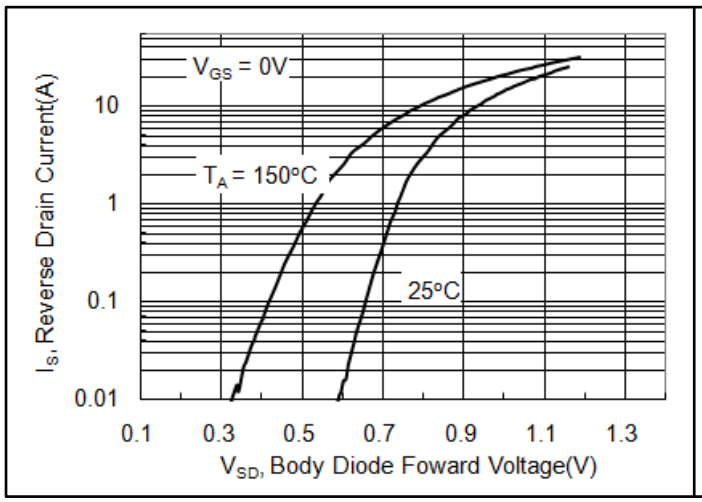


Fig 7. Forward characteristics of reverse diode

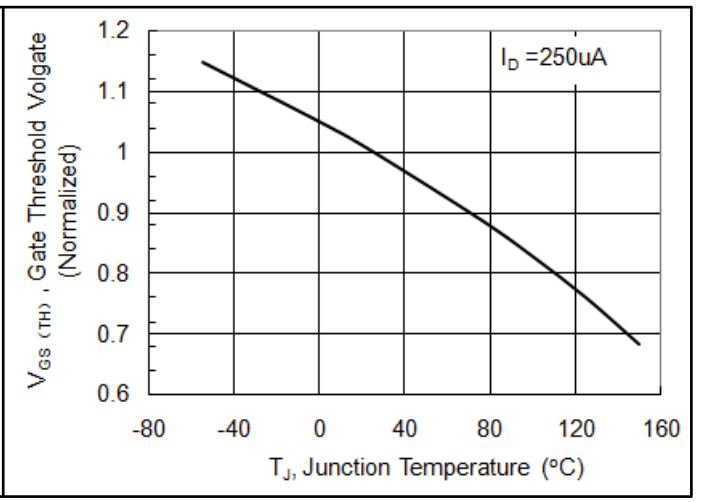


Fig 8. $V_{GS(TH)}$ vs junction temperature

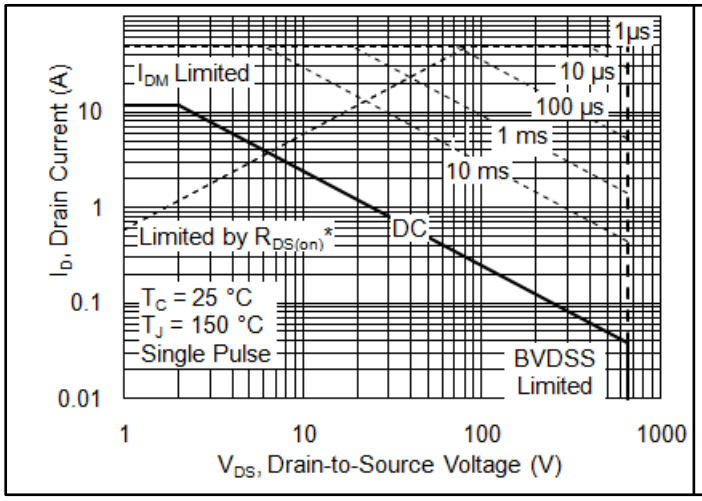


Fig 9 . Safe operating area (TO-220F)

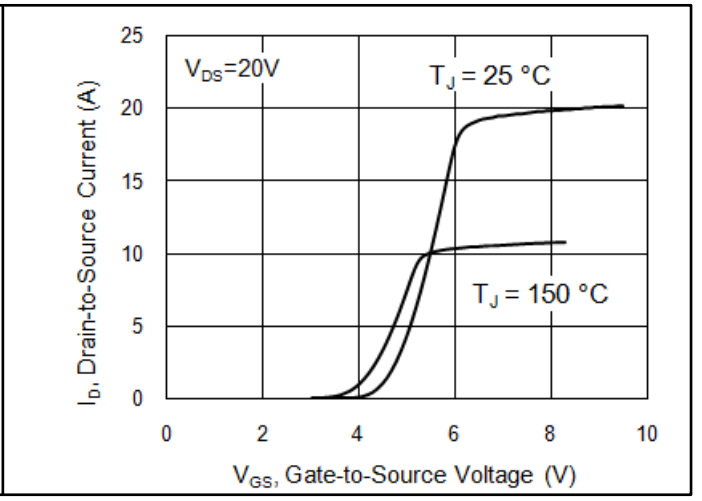


Fig 10. Transfer characteristics

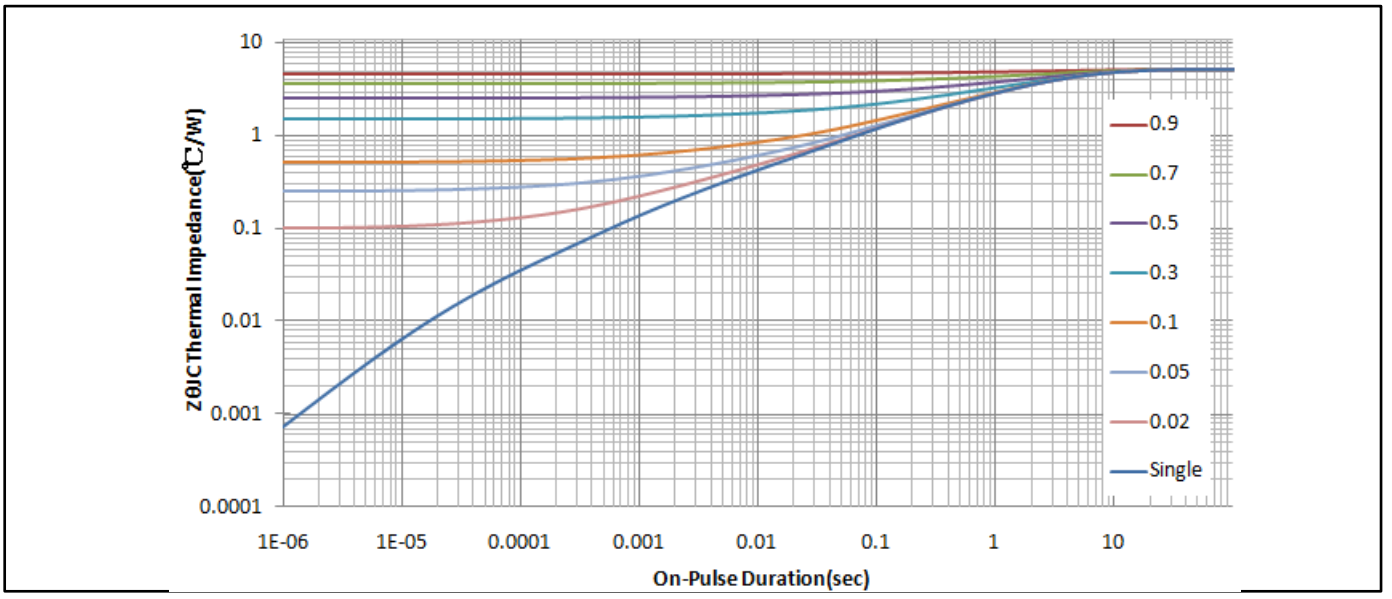


Fig 11 . Transient thermal impedance(TO-220F)

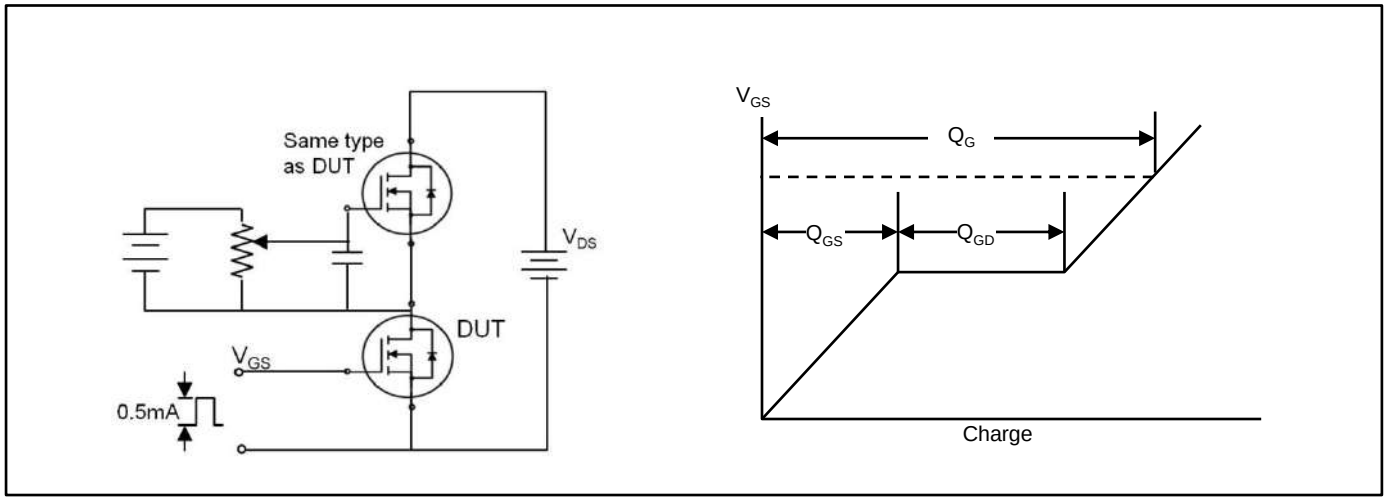


Fig 12. Gate charge test circuit & waveform

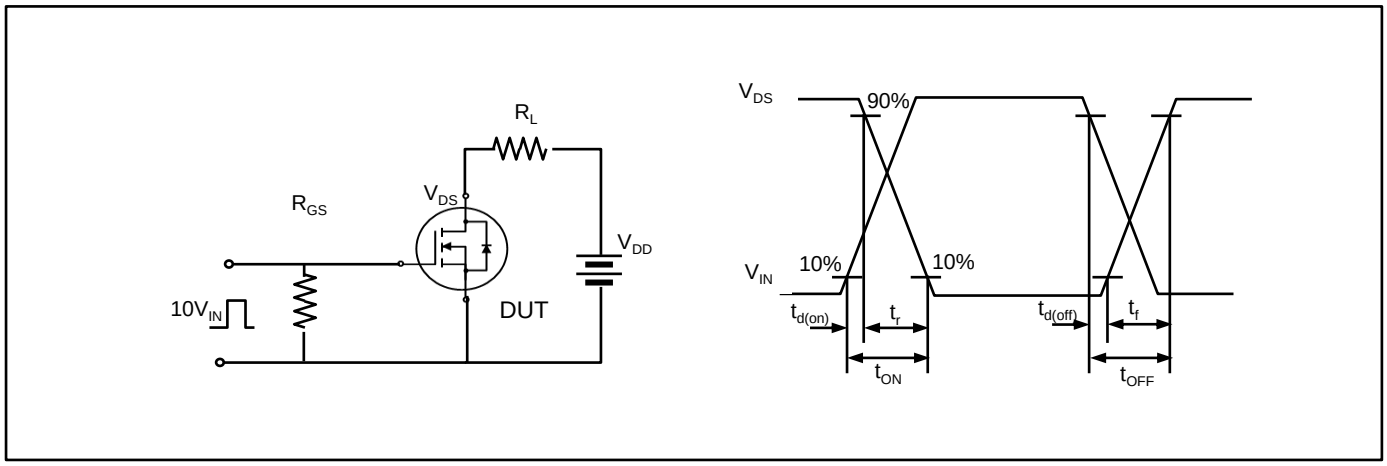


Fig 13. Switching time test circuit & waveform

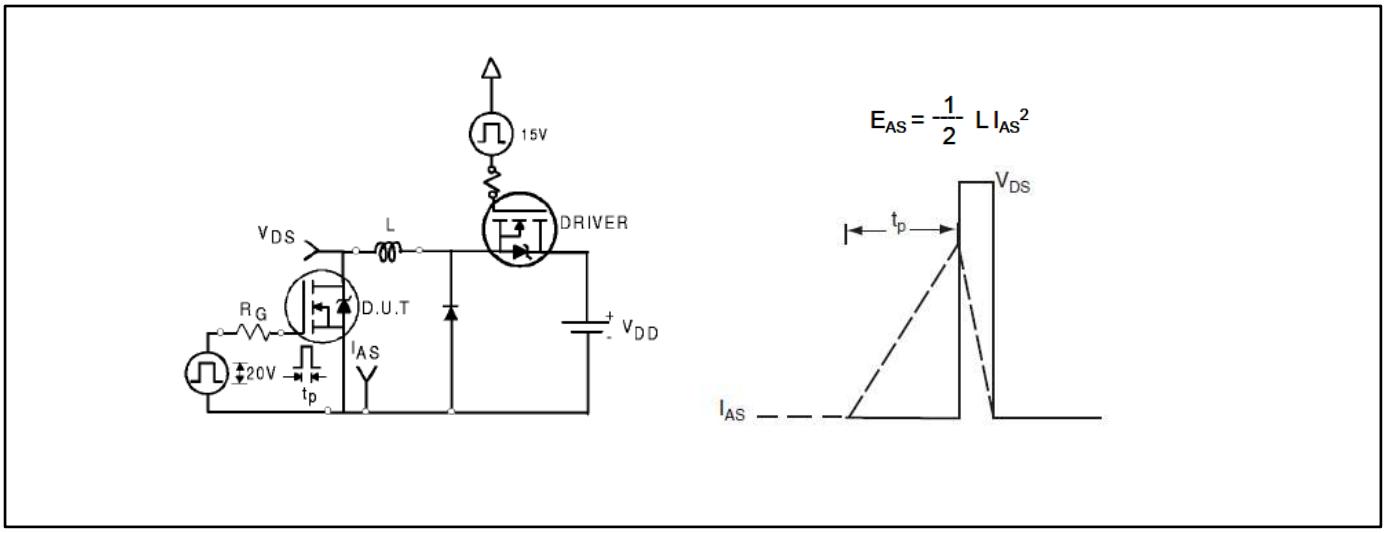


Fig 14. Unclamped Inductive switching test circuit & waveform

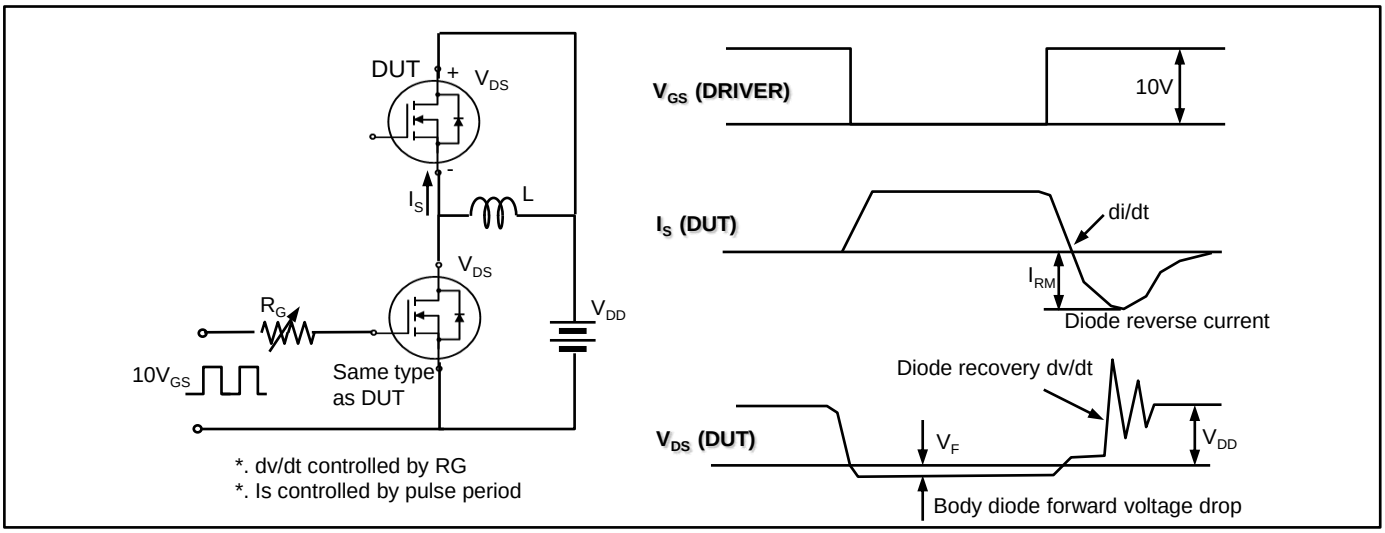
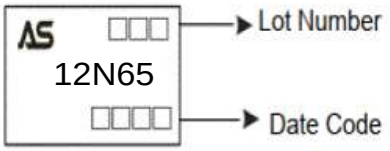


Fig 15. Peak diode recovery dv/dt test circuit & waveform

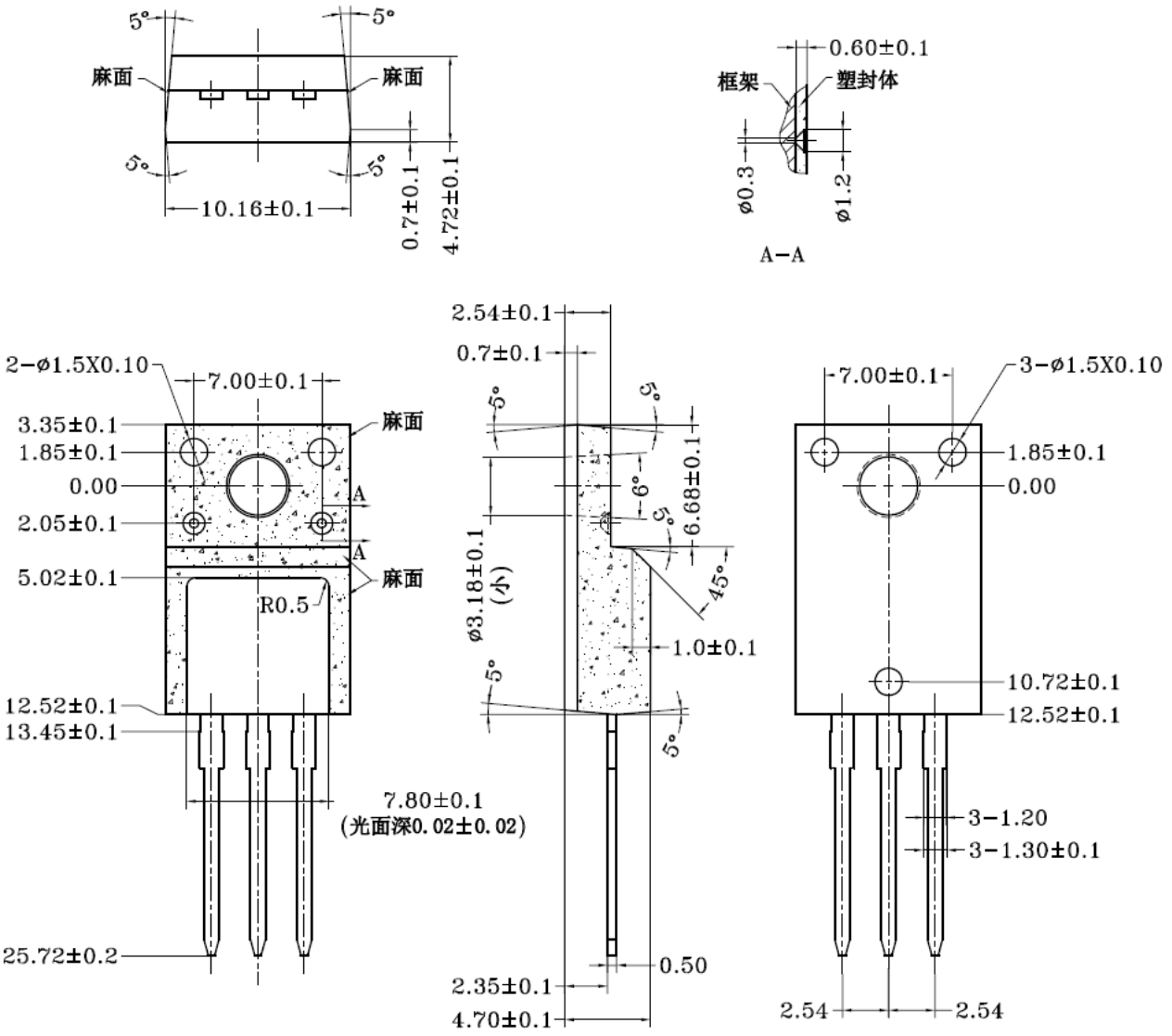
Ordering and Marking Information

Ordering Device No.	Marking	Package	Packing	Quantity
ASDM12N65F-T	12N65	TO-220F	Tube	50/Tube

PACKAGE	MARKING
TO-220F	

Package Dimensions

TO-220F



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