

650V N-Channel Super-Junction MOSFET

Features

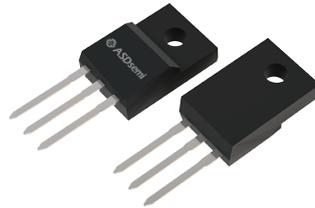
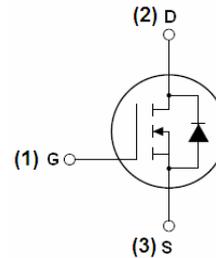
- Super-Junction MOSFET
- Low ON Resistance
- Improved dv/dt Capability
- 100% Avalanche Tested
- RoHS compliant

Product Summary

V_{DS}	650	V
$R_{DS(on), Typ @ V_{GS} = 10V}$	227	m Ω
I_b	15	A

Application

- Switching Mode Power Supplies (SMPS)
- PWM Motor Controls
- LED Lighting
- Adapter


TO-220F


ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)			
Parameter	Symbol	Limit	Unit
		TO-220F	
Drain to Source Voltage	V_{DSS}	650	V
Continuous Drain Current (@ $T_C=25^\circ\text{C}$)	I_D	15 ⁽¹⁾	A
Continuous Drain Current (@ $T_C=100^\circ\text{C}$)		9 ⁽¹⁾	A
Drain current pulsed ⁽²⁾	I_{DM}	45 ⁽¹⁾	A
Gate to Source Voltage	V_{GS}	± 30	V
Single pulsed Avalanche Energy ⁽³⁾	E_{AS}	270	mJ
MOSFET dv/dt Ruggedness($V_{DS}=0\sim 400\text{V}$)	dv/dt	40	V/ns
Peak diode Recovery dv/dt ⁽⁴⁾	dv/dt	15	V/ns
Total power dissipation (@ $T_C=25^\circ\text{C}$)	P_D	33	W
Derating Factor above 25 $^\circ\text{C}$		0.26	W/ $^\circ\text{C}$
Operating Junction Temperature & Storage Temperature	T_{STG}, T_J	-55 to + 150	$^\circ\text{C}$
Maximum lead temperature for soldering purpose	T_L	260	$^\circ\text{C}$

THERMAL CHARACTERISTICS			
Parameter	Symbol	Value	Unit
		TO-220F	
Thermal resistance, Junction to case	R_{thjc}	3.76	$^\circ\text{C}/\text{W}$
Thermal resistance, Junction to ambient	R_{thja}	67	$^\circ\text{C}/\text{W}$

Notes

1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. $L = 60\text{mH}$, $I_{AS} = 3\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting at $T_J = 25^\circ\text{C}$
4. $I_{SD} \leq I_D$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{DD} \leq 400\text{V}$, Starting at $T_J = 25^\circ\text{C}$

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ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise specified)						
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain to source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	--	--	V
Breakdown voltage temperature coefficient	$\Delta BV_{DSS} / \Delta T_J$	$I_D=250\mu A$, referenced to 25°C	--	0.7	--	$V/^\circ\text{C}$
Drain to source leakage current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$	--	--	1	μA
		$V_{DS}=520V, T_C=125^\circ\text{C}$	--	--	10	μA
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	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3.1	4.5	V
Drain to source on state resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=7.5A$	--	227	260	$m\Omega$
Forward Transconductance	G_{fs}	$V_{DS}=10V, I_D=7.5A$	--	13.5	--	S
Dynamic Characteristics						
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$	--	1473	--	pF
Output capacitance	C_{oss}		--	68	--	
Reverse transfer capacitance	C_{rss}		--	1	--	
Turn on delay time	$t_{d(on)}$	$V_{DS}=325V, I_D=15A, R_G=25\Omega, V_{GS}=10V$	--	25	--	ns
Rising time	t_r		--	34.5	--	
Turn off delay time	$t_{d(off)}$		--	107	--	
Fall time	t_f		--	28	--	
Total gate charge	Q_g	$V_{DS}=325V, V_{GS}=10V, I_D=15A$	--	25.2	--	nC
Gate-source charge	Q_{gs}		--	5.9	--	
Gate-drain charge	Q_{gd}		--	9.7	--	
Gate Resistance	R_g	$V_{DS}=0V$, Scan F mode	--	10	--	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	--	--	15	A
Pulsed source current	I_{SM}		--	--	45	A
Diode forward voltage drop.	V_{SD}	$I_S=15A, V_{GS}=0V$	--	0.9	1.3	V
Reverse recovery time	T_{rr}	$I_S=15A, V_{GS}=0V, dl_f/dt=100A/\mu s$	--	260	--	ns
Reverse recovery Charge	Q_{rr}		--	3.5	--	μC

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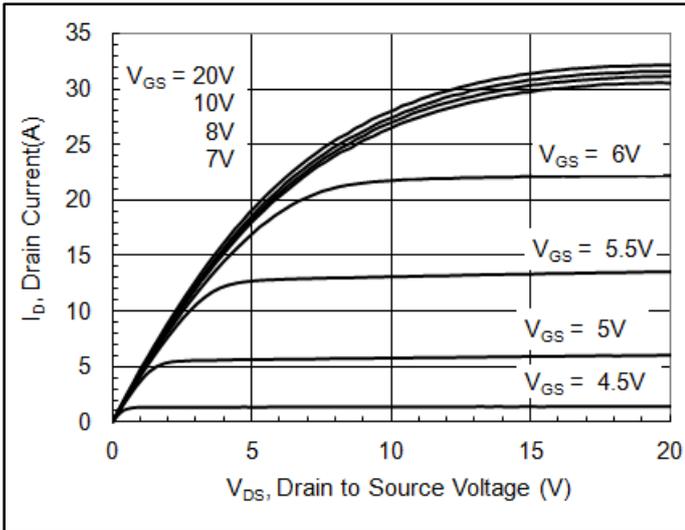


Fig1. Output characteristics

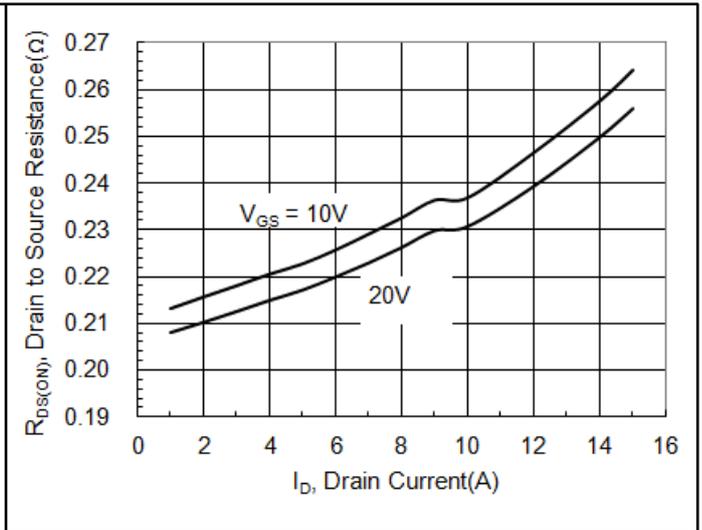


Fig2. Drain-source on-state resistance

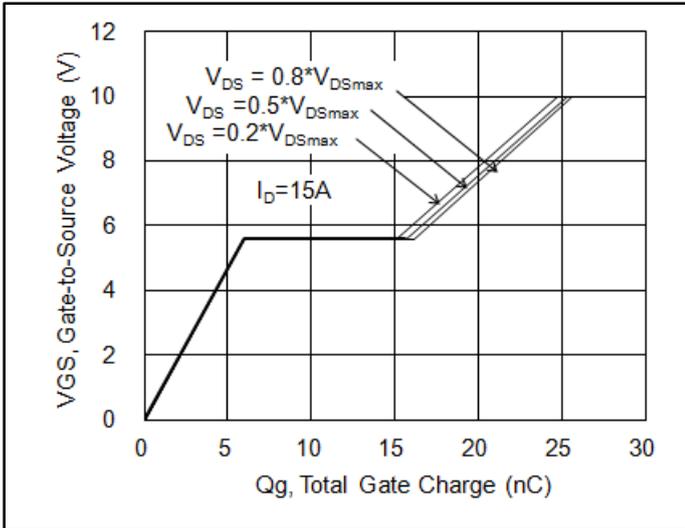


Fig3. Gate charge characteristics

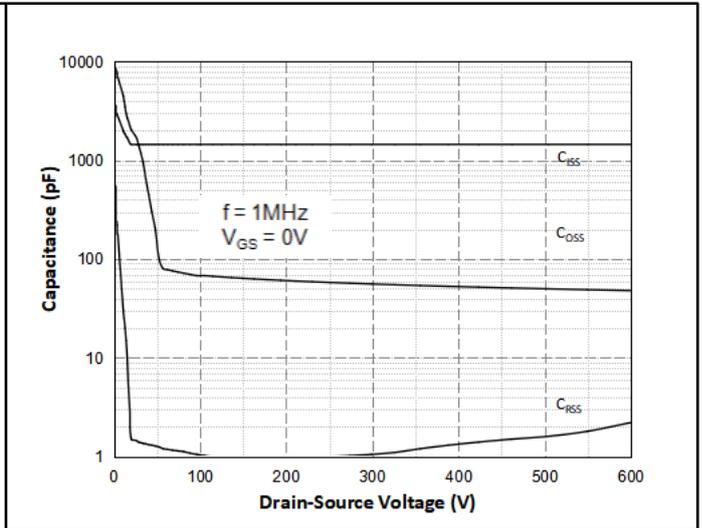


Fig4. Capacitance Characteristics

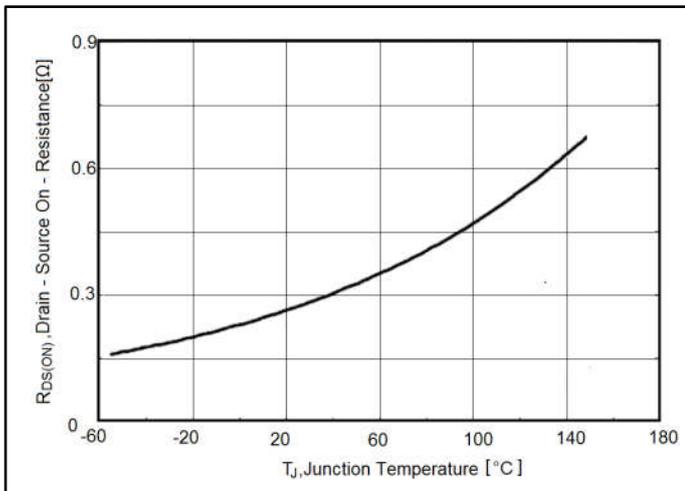


Fig5. $R_{DS(ON)}$ vs junction temperature

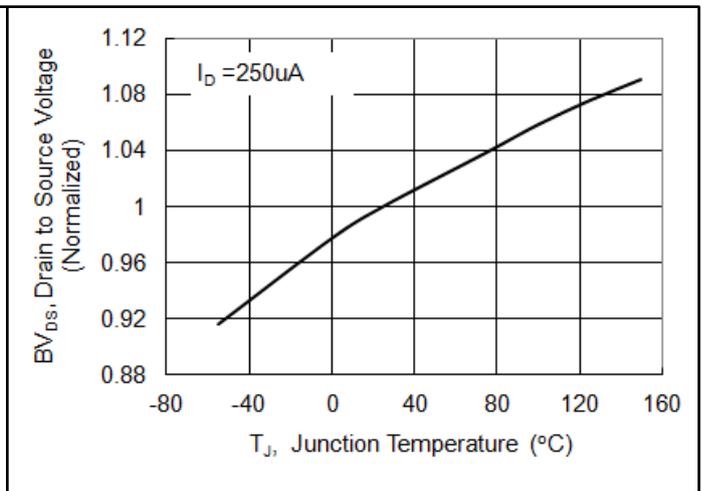


Fig6. BV_{DS} vs junction temperature

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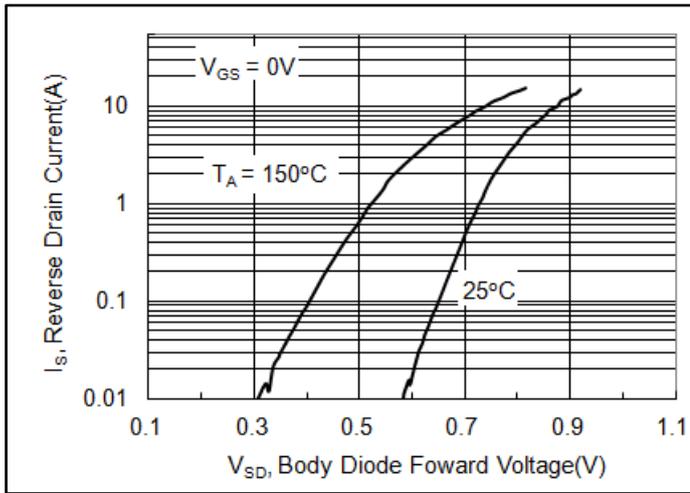


Fig 7 . Forward characteristics of reverse diode

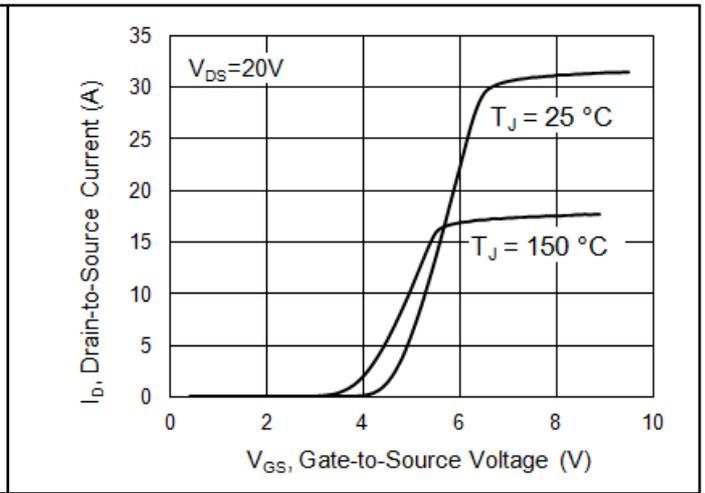


Fig 8 . Transfer characteristics

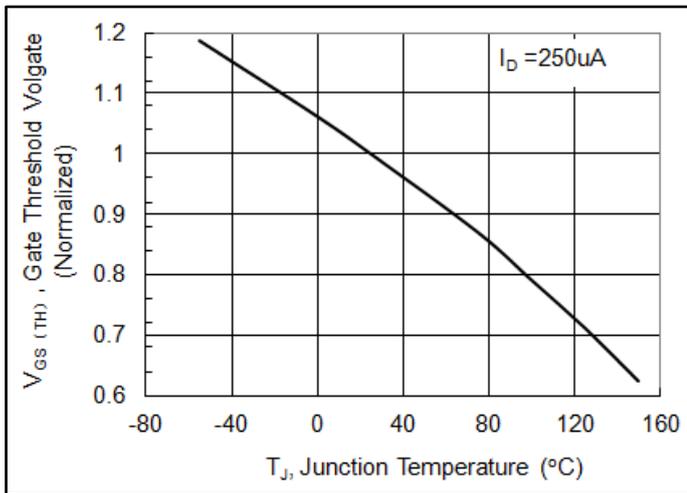


Fig 9 . $V_{GS(TH)}$ vs junction temperature

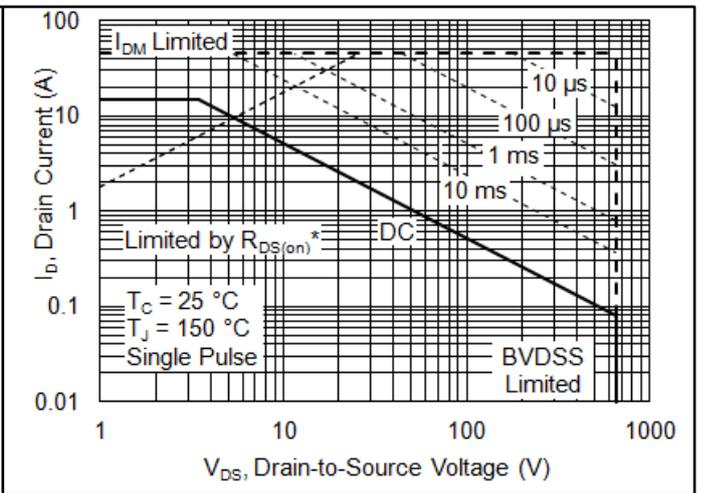


Fig 10. Safe operating area

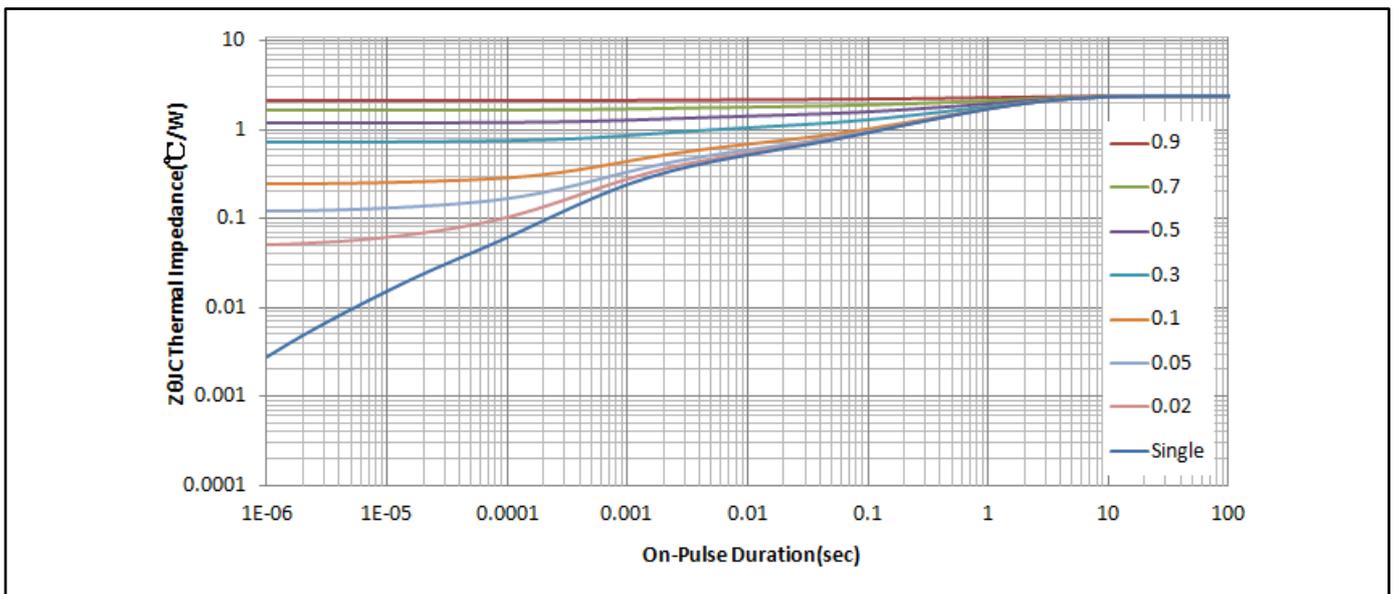


Fig 11. Transient thermal impedance

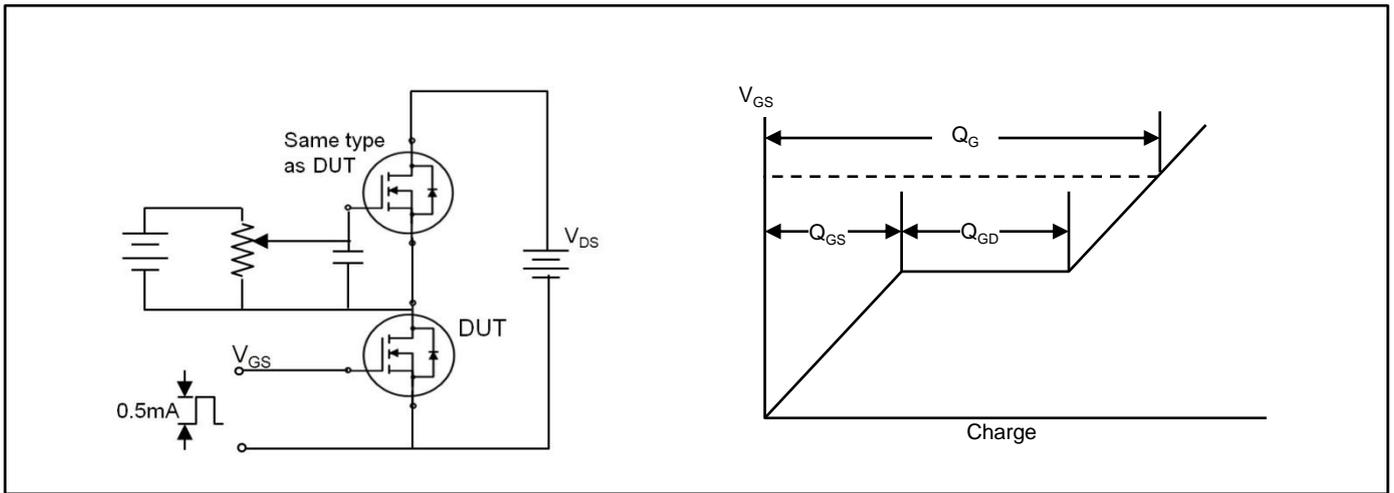


Fig 12. Gate charge test circuit & waveform

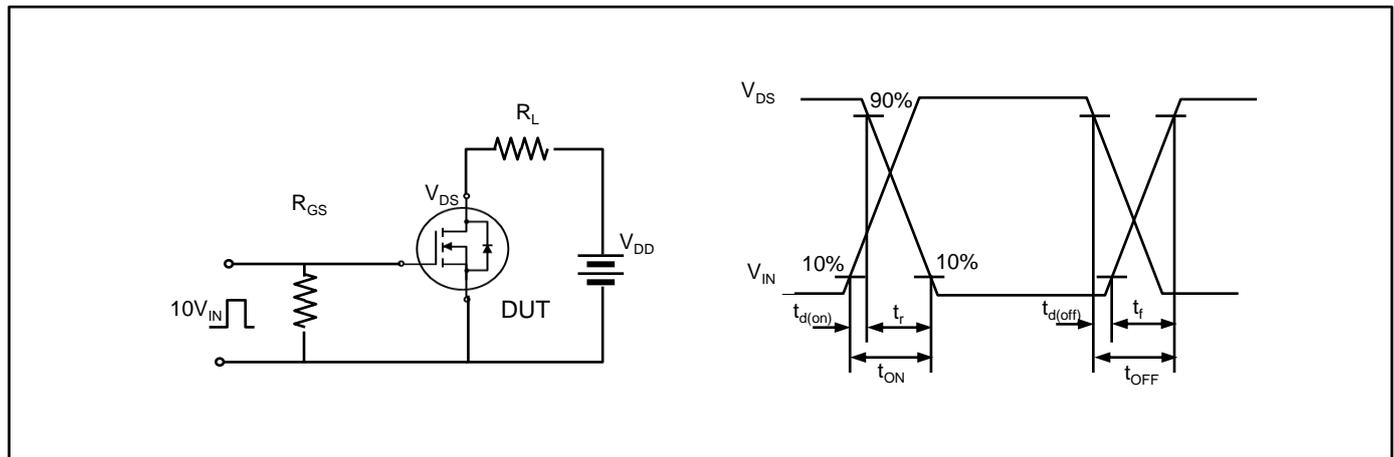


Fig 13. Switching time test circuit & waveform

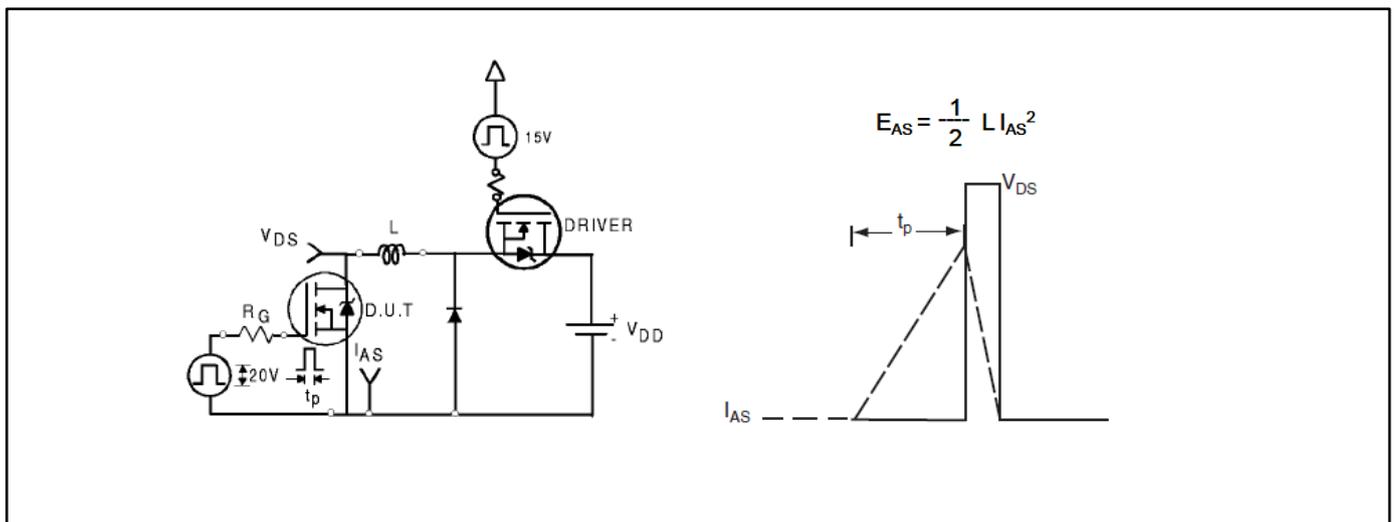


Fig 14. Unclamped Inductive switching test circuit & waveform

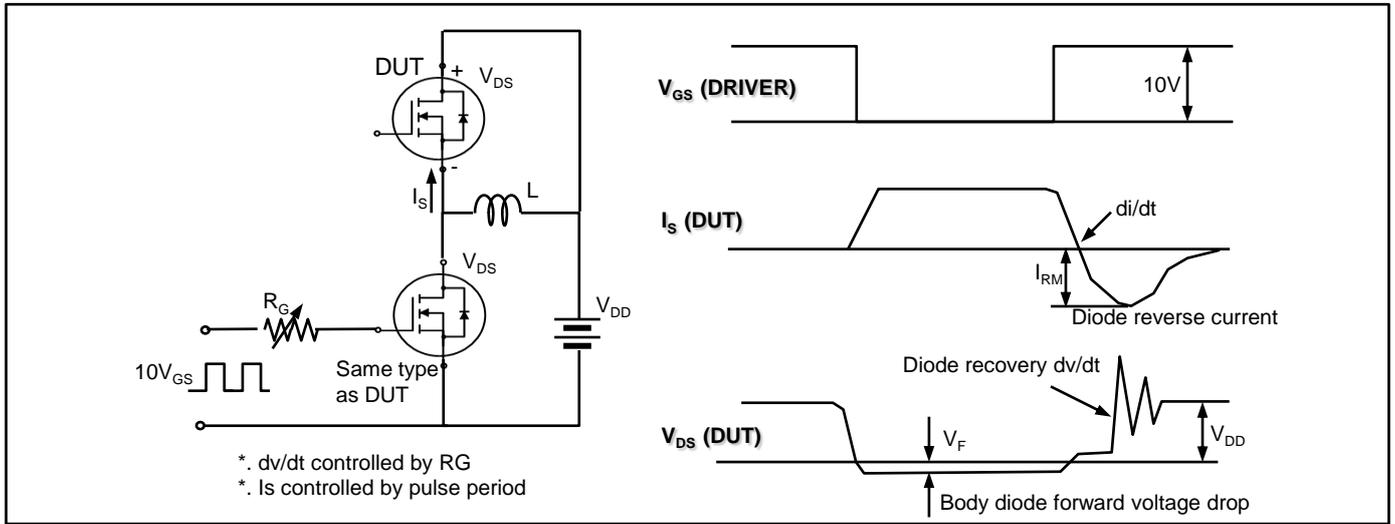
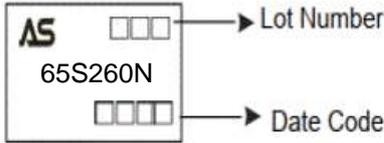


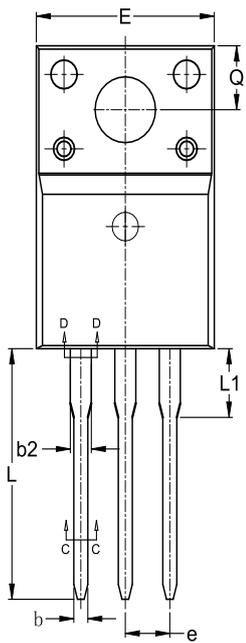
Fig 15. Peak diode recovery dv/dt test circuit & waveform

Ordering and Marking Information

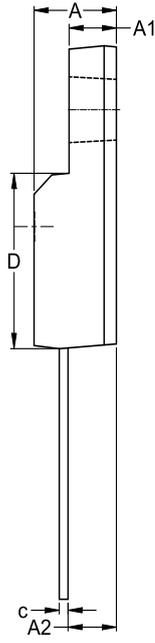
Ordering Device No.	Marking	Package	Packing	Quantity
ASDM65S260NF-T	65S260N	TO-220F	Tube	50/Tube

PACKAGE	MARKING
TO-220F	 <p>AS □□□□ → Lot Number 65S260N □□□□ → Date Code</p>

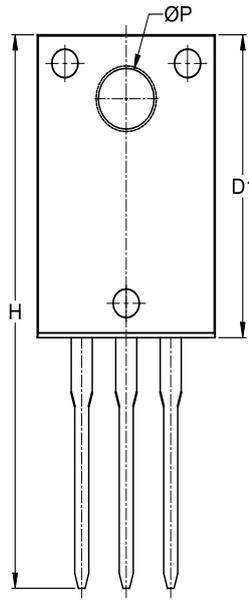
TO-220F



TOP VIEW

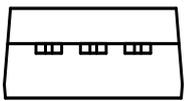


SIDE VIEW(Right)

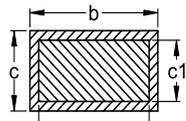


BOTTOM VIEW

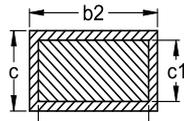
DIM SYMBOL	MIN.	NOM.	MAX.
A	4.600	4.700	4.800
A1	2.600	2.700	2.800
A2	2.660	2.760	2.860
b	0.740	0.840	0.940
b1	0.700	0.800	0.900
b2	1.140	1.240	1.340
b3	1.100	1.200	1.300
c	0.440	0.540	0.640
c1	0.400	0.500	0.600
D	9.090	9.190	9.290
D1	15.770	15.870	15.970
E	10.060	10.160	10.260
e	2.540 BSC.		
H	28.800	29.000	29.200
L	12.930	13.130	13.330
L1	3.400	3.600	3.800
ØP	3.080	3.180	3.280
Q	3.150	3.350	3.550



SIDE VIEW(Front)



SECTION:C-C



SECTION:D-D

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