

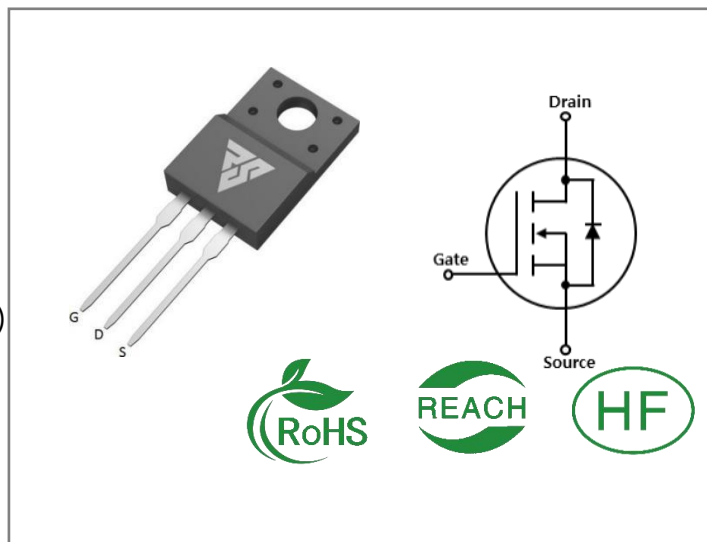
ID	$R_{DS(ON)}$ (Max)	VDSS
25A	140mΩ	600V

Applications:

- TV and PC Power
- Adopter and Lighting
- Telecom and UPS(Uninterruptible Power Supply)

Features:

- Low gate charge
- Low $R_{DS(on)}$ per chip area(Low FOM)
- Very low switching and conduction loss
- Extremely high commutation ruggedness
- Ultra fast body diode



Ordering Information

Part Number	Package	Marking	Packing	Qty.
RSF60R140F	TO-220F	RSF60R140F	Tube	50 PCS

Absolute Maximun Ratings $T_c = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	RSF60R140F	Units
VDSS	Drain-to-Source Voltage	600	V
ID	Continuous Drain Current $T_C = 25^\circ\text{C}$ (Note*1)	25	A
ID	Continuous Drain Current $T_C = 100^\circ\text{C}$ (Note*1)	15.8	
IDM	Pulsed Drain Current (Note*2)	75	
PD	Power Dissipation	36	W
VGS	Gate- to- Source Voltage	± 30	V
EAS	Single Pulse Avalanche Ennergy $T_j = 25^\circ\text{C}$, $I_{AS} = 8\text{A}$ $V_{DD} = 100\text{V}$, $I_D = I_{AR}$	960	mJ
dv/dt	MOSFET dv/ dt ruggedness $V_{DS} = 0 \dots 400\text{V}$	50	V/ns
dv/dt	Reverse diode dv/dt $V_{DS} = 0 \dots 400\text{V}$, $T_j = 25^\circ\text{C}$, $I_{SD} \leq I_D$	15	V/ns
TL TPKG	Maximum Temperature for Soldering	300	$^\circ\text{C}$
	Leads at 0.063in(1.6mm)from Case for 10 seconds Package Body for 10 seconds	260	
TJ and TSTG	Operating Junction and Storage Temperature Range	-55 to 150	

* Drain Current Limited by Maximum Junction Temperature

Caution: Stresses greater than those listed in the " Absolute Maximum Ratings" Table may cause permanent damage to the device.

Thermal Resistance

Symbol	Parameter	RSF60R140F	Units	Test Conditions
R θ JC	Junction-to-Case	3.6	°C / W	Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 150 °C
R θ JA	Junction-to- Ambient	80		1 cubic foot chamber, free air.

OFF Characteristics T_J= 25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BVDSS	Drain- to- source Breakdown Voltage	600	--	--	V	V _{GS} =0V I _D =0.25mA
IDSS	Drain- to- Source Leakage Current	--	--	5	μA	V _D S=600V V _{GS} =0V T _j = 25°C
IGSS	Gate- to- Source Forward Leakage	--	--	100	nA	V _{GS} =±30 T _j = 25°C

ON Characteristics T_J=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R _{DS(on)}	Static Drain- to- Source On-Resistance	--	120	140	mΩ	V _{GS} =10V I _D =13A
V _{GS(TH)}	Gate Threshold Voltage	3	4	5	V	V _{GS} =V _D S I _D =0.25mA

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t _{d(ON)}	Turn- on Delay Time	--	32	--	nS	V _D S=400V I _D =13A R _G =15Ω V _{GS} =10V
t _{rise}	Rise Time	--	24	--		
t _{d(OFF)}	Turn- OFF Delay Time	--	97	--		
t _{fall}	Fall Time	--	20	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance	--	1950	--	pF	VGS=0V VDS=100V f=1.0MHz
Coss	Output Capacitance	--	85	--		
Crss	Reverse Transfer Capacitance	--	1.7	--		
Qg	Total Gate Charge	--	43	--	nC	VDS=400V ID=13A VGS=10V
Qgs	Gate- to- Source Charge	--	12.3	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	15.5	--		
RG	Gate resistance	--	4	--	Ω	f=1MHz ID= 0A(open drain)

Source- Drain Diode Characteristics

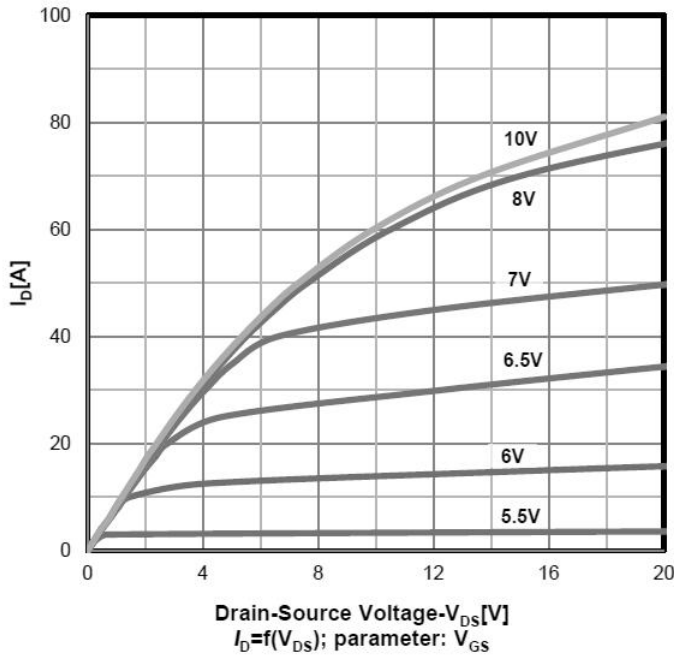
Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	25	A	Integral pn- diode in MOSFET
ISM	Maximum Pulsed Current	--	--	100	A	
VSD	Diode Forward Voltage	--	--	1.4	V	IS=25A,VGS=0V
trr	Reverse Recovery Time	--	150	--	nS	VR=400V IS=13A di/dt=100A/μs
Qrr	Reverse Recovery Charge	--	0.9	--	μC	
Irr	Reverse recovery current	--	12	--	A	

Notes:

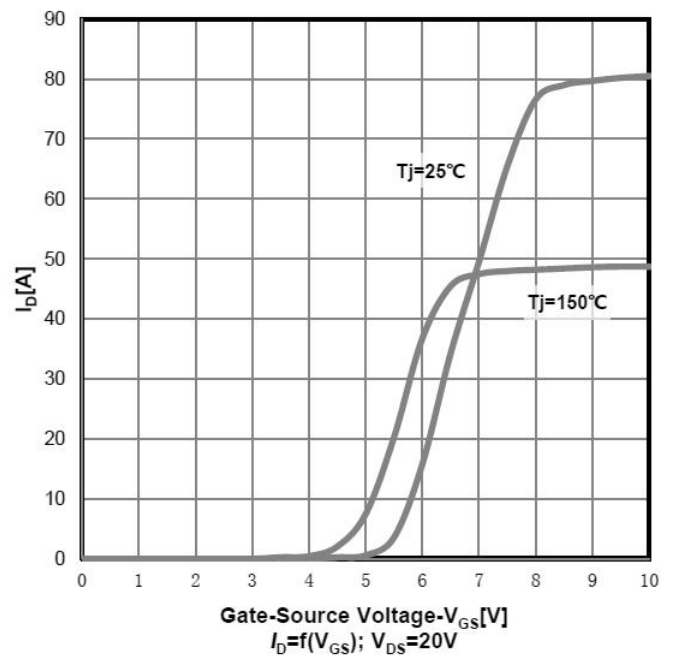
- * 1. limited by Tjmax.
- * 2.Pulse width limited by Tjmax

Typical Feature Curve

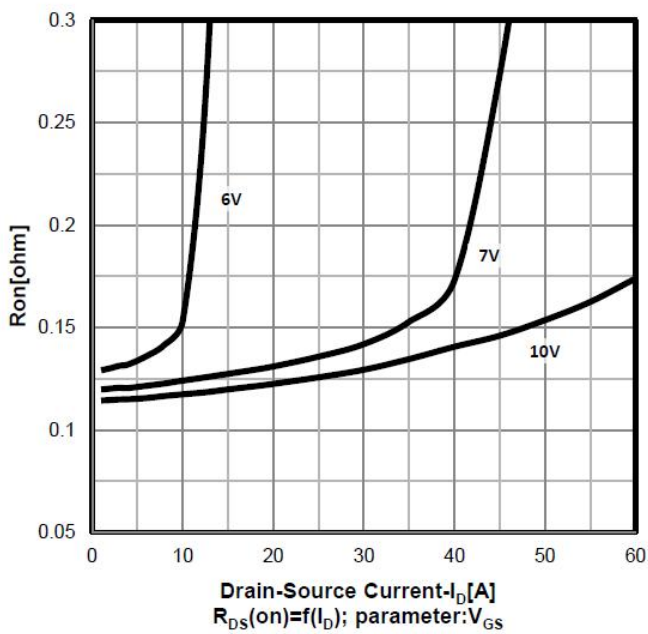
Typ. output characteristics $T_j=25^\circ\text{C}$



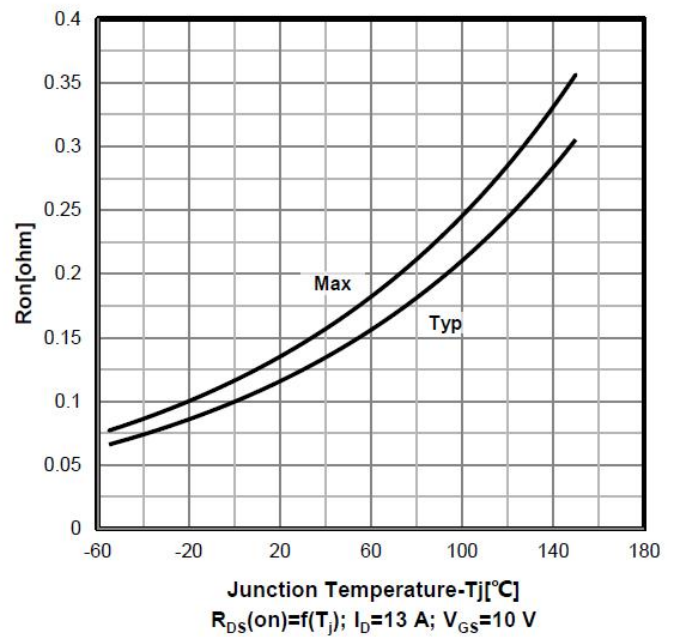
Transfer characteristics



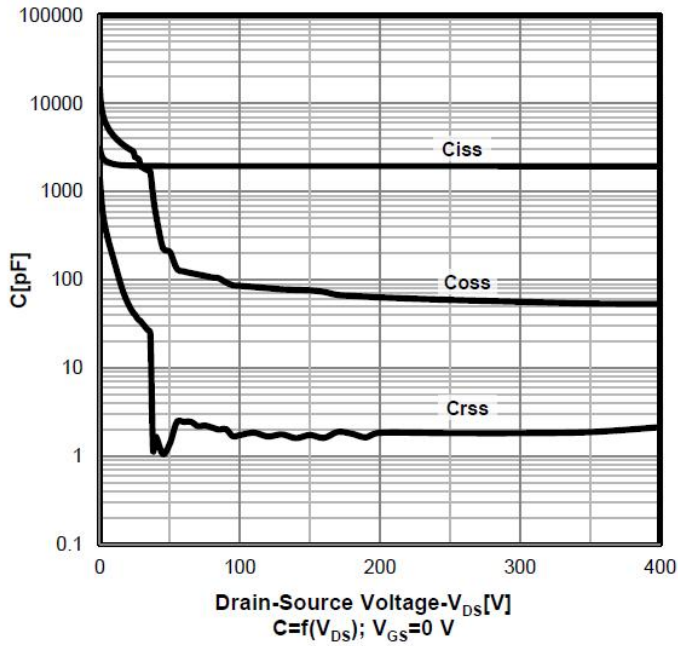
Typ. drain-source on-state resistance



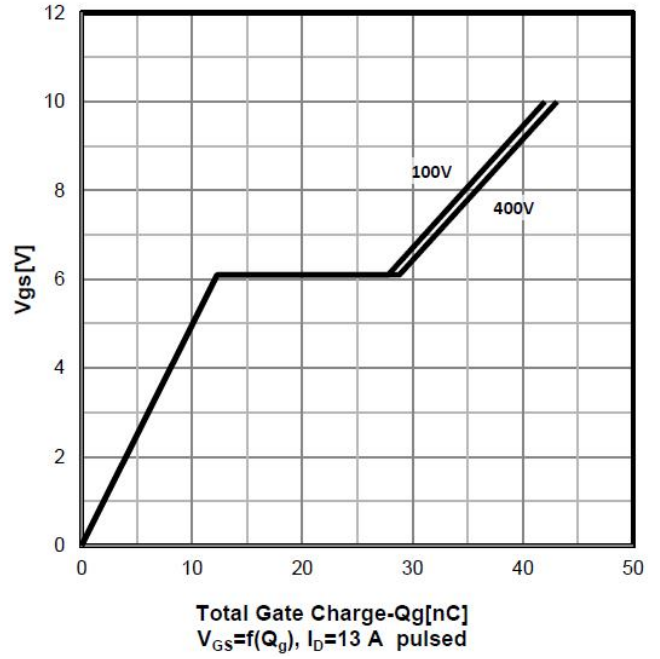
On-resistance vs temperature



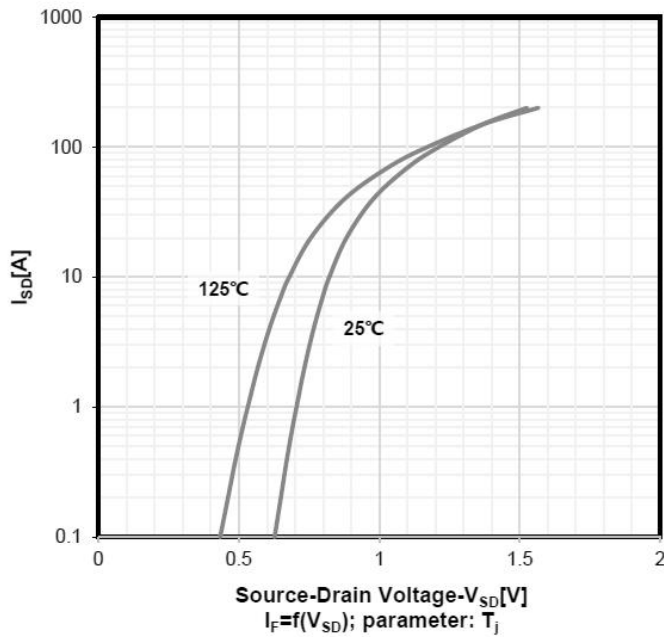
Typ. capacitances



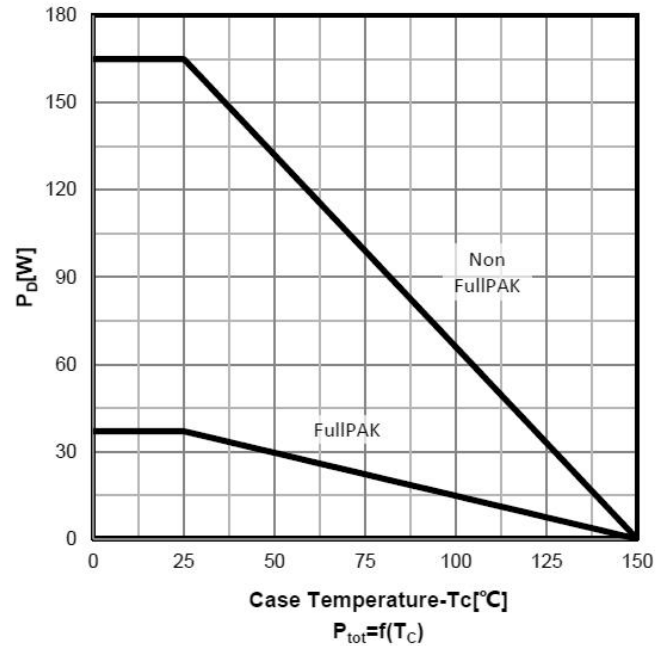
Typ. gate charge characteristics



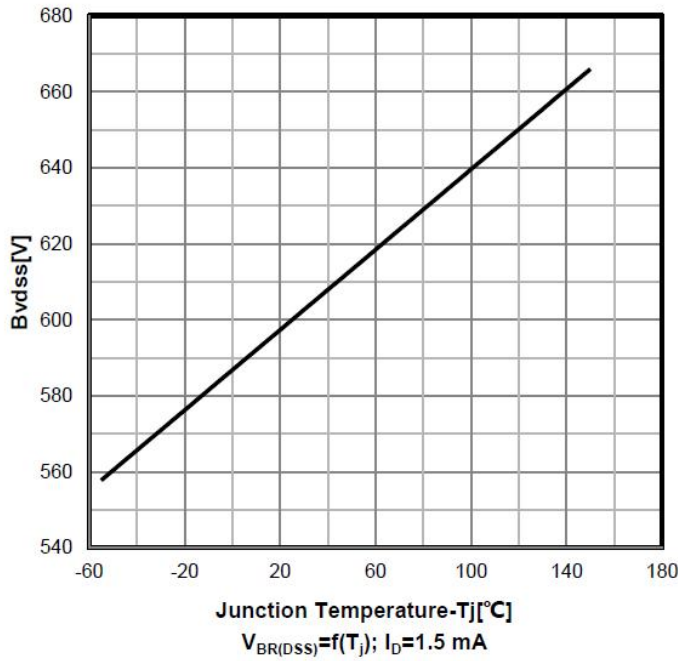
Forward characteristics of reverse diode



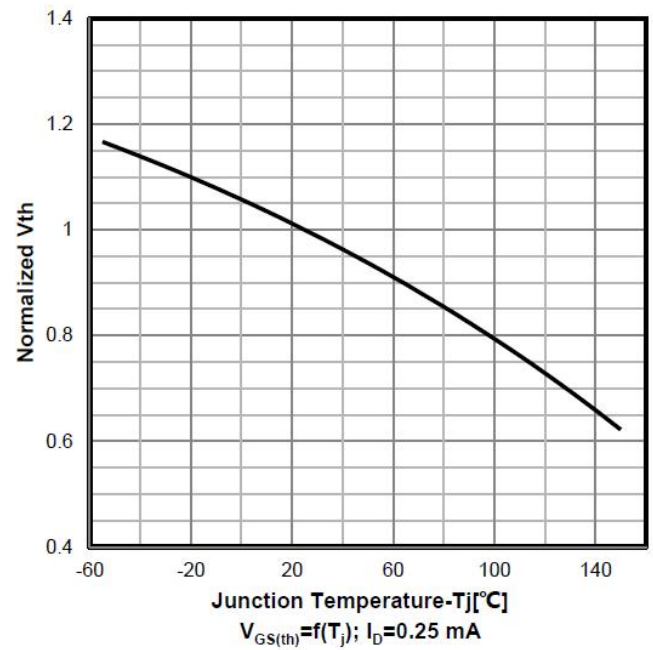
Power dissipation



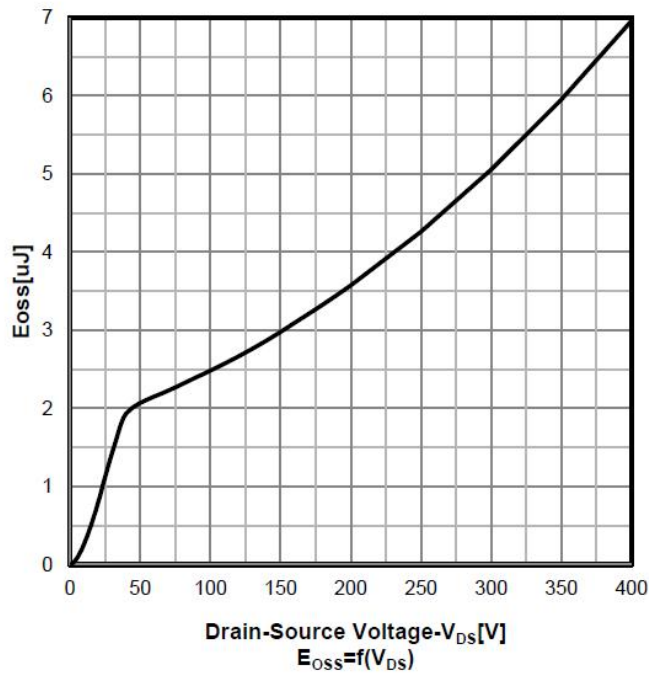
Drain-source breakdown voltage



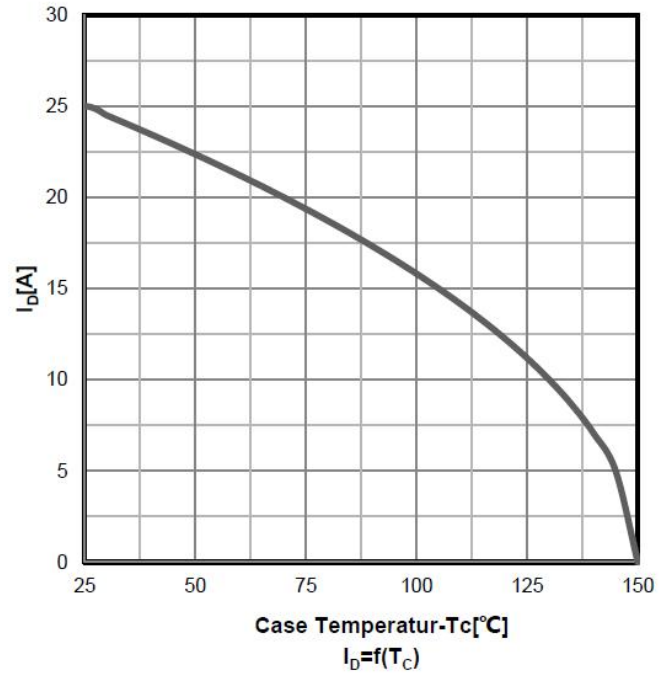
Normalized $V_{GS(th)}$ characteristics



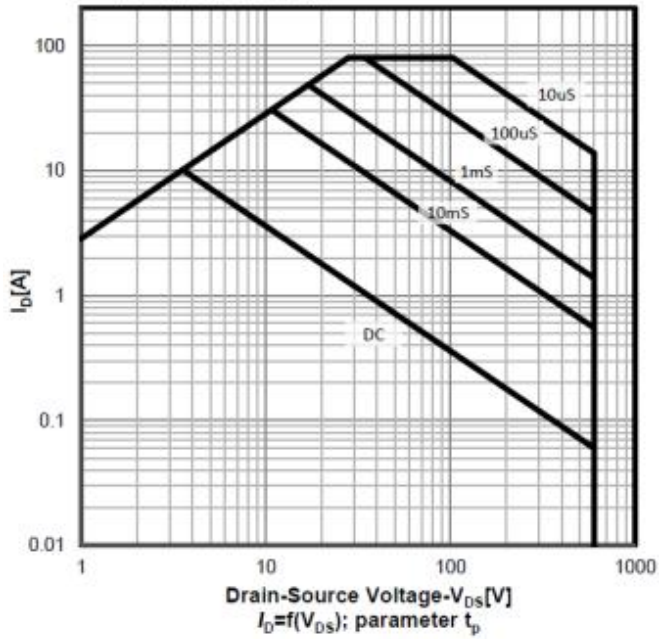
Coss stored energy



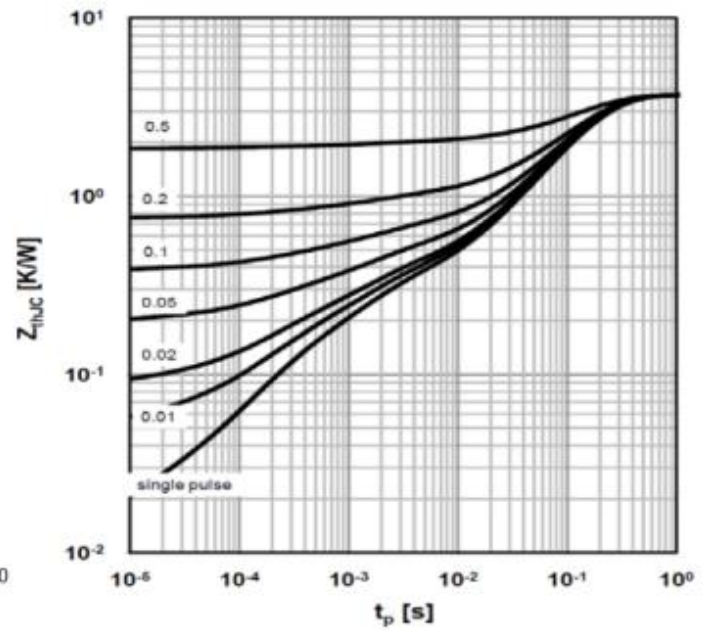
Drain current vs temperature



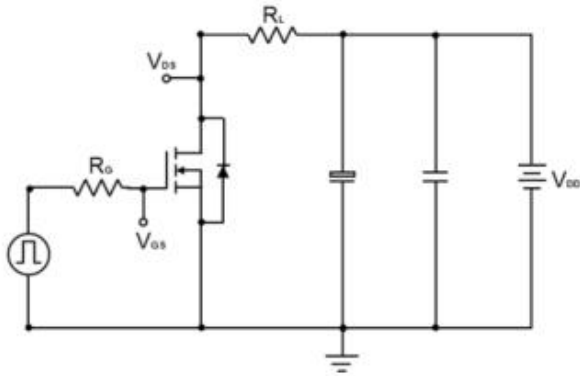
Safe operating area TC=25 °C
TO-220FullPAK



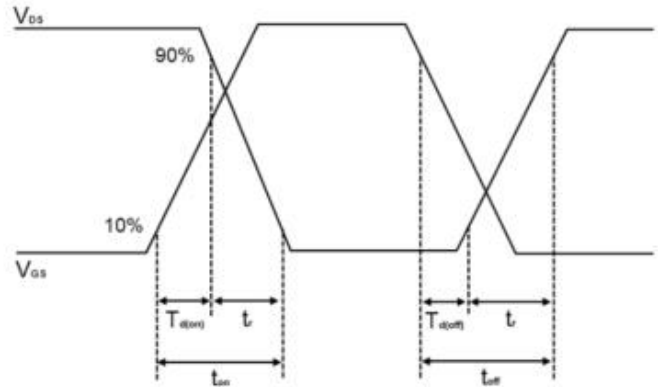
Max. transient thermal impedance
TO-220FullPAK



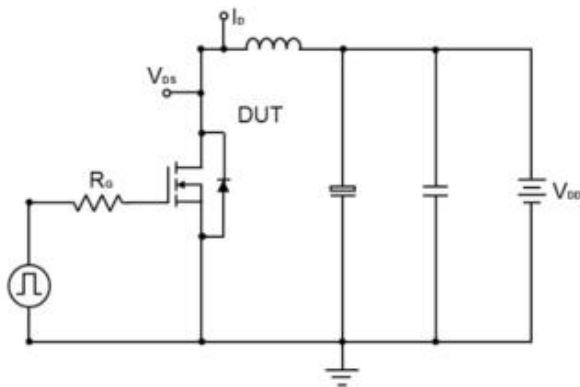
Test Circuits and Waveforms



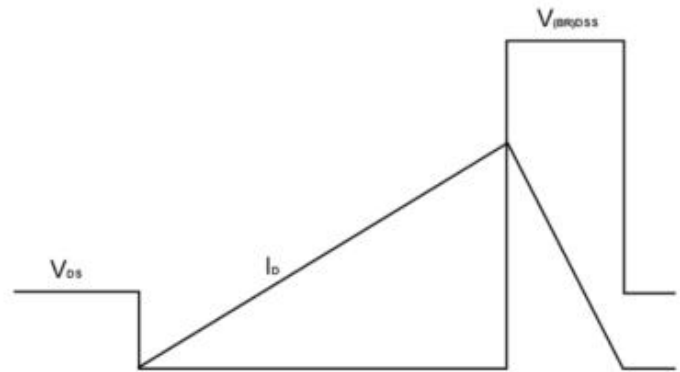
Test circuit for resistive load switching times



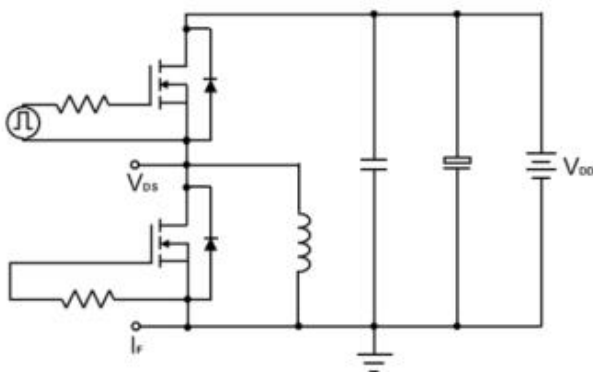
Switching times waveform



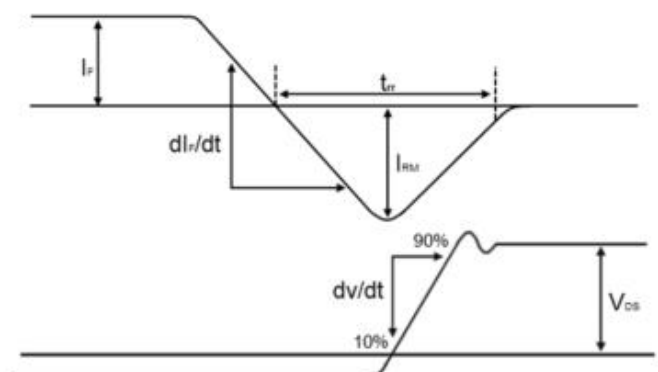
Test circuit for unclamped inductive load



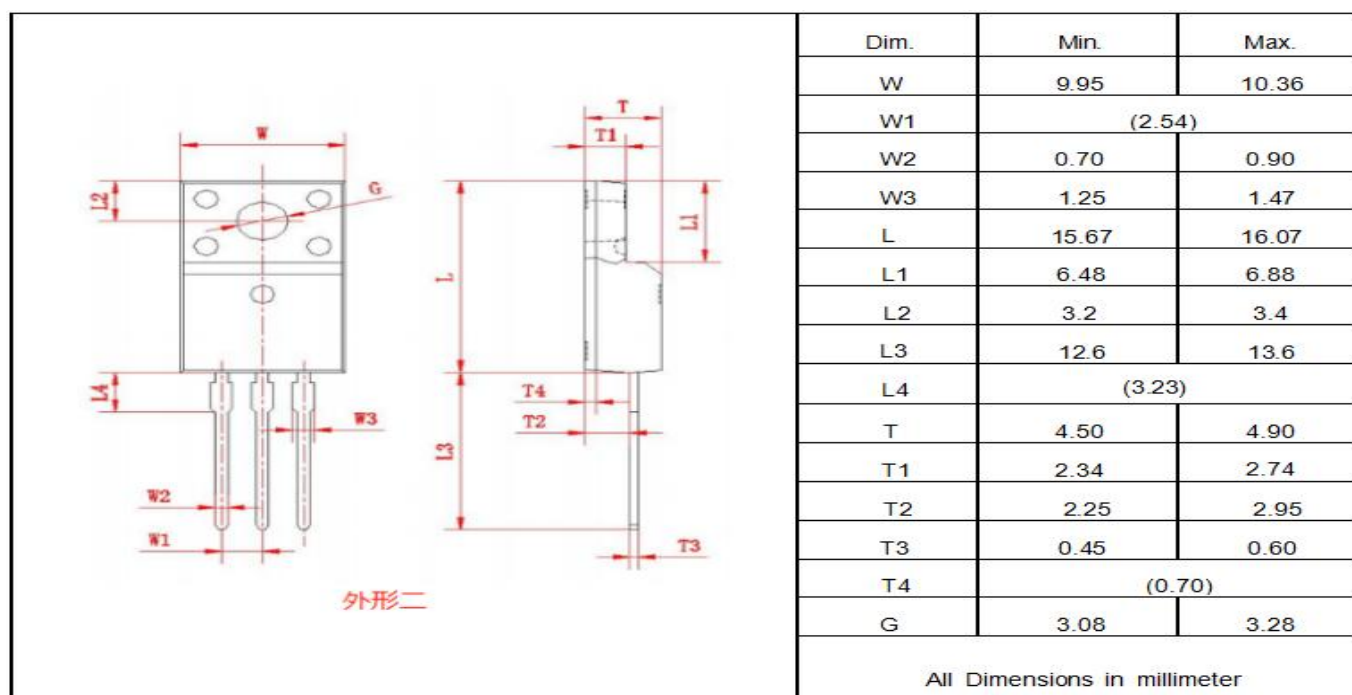
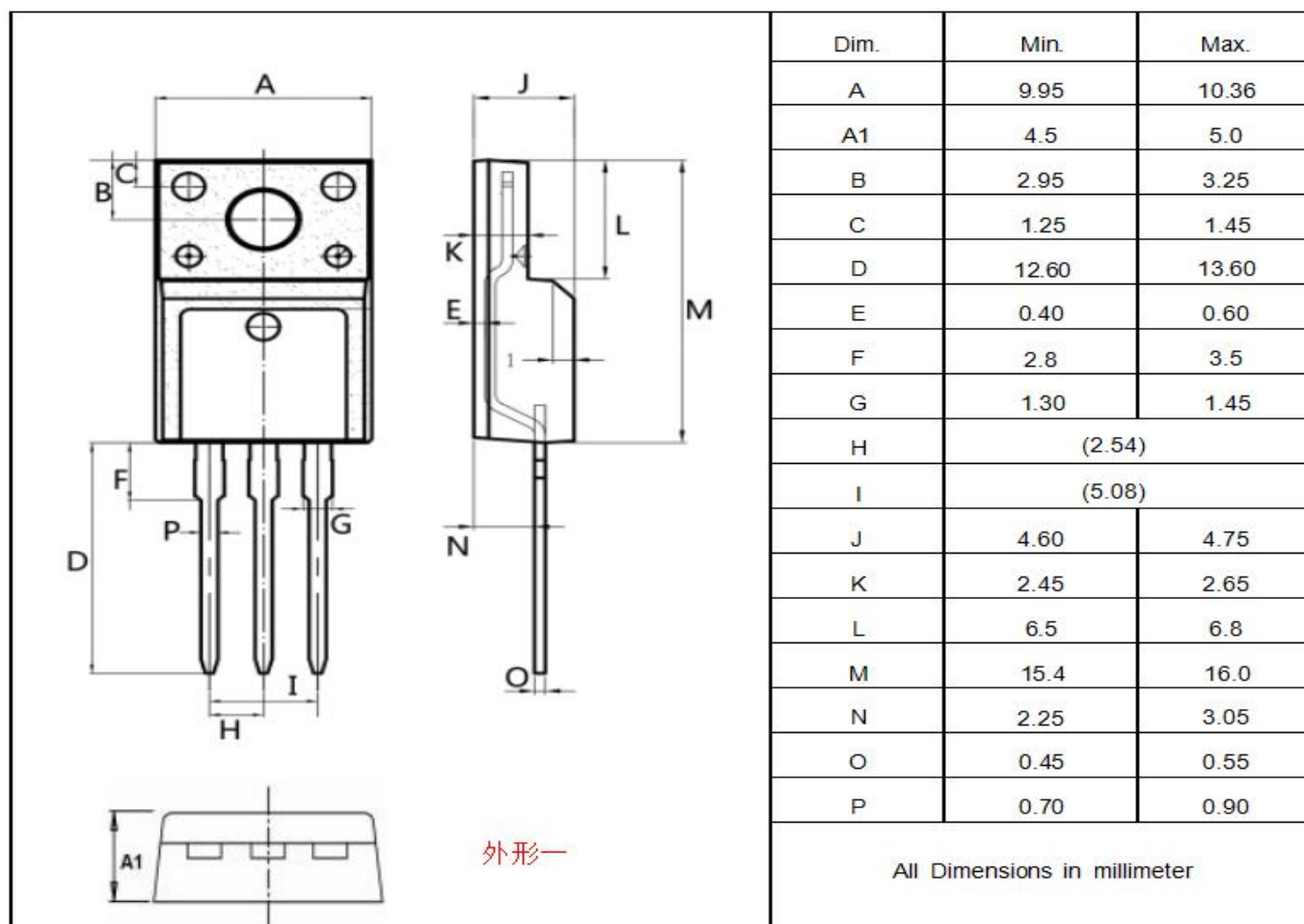
Unclamped inductive waveform



Test circuit for diode characteristics



Diode recovery waveform

Package outline drawing (TO-220F Unit: mm)


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