

Features

- Low on resistance
- Low reverse transfer capacitances
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test
- Pb-Free plating / Halogen-Free / RoHS compliant

Applications

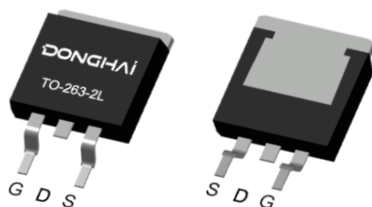
- Motor Control and Drive
- Charge/Discharge for Battery Management System
- Synchronous Rectifier for SMPS

Key Parameters

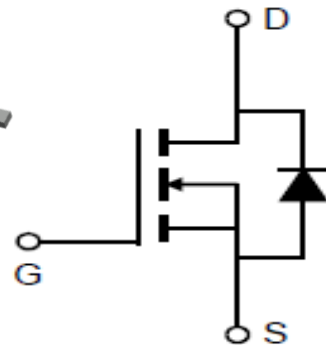
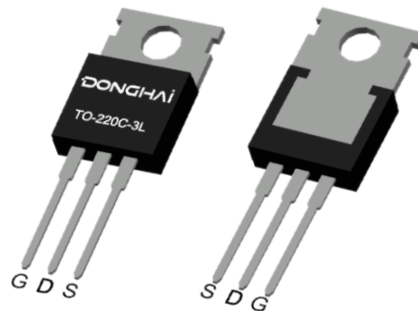
V_{DS}	100V
$R_{DS(on)typ. (TO-263)}$	4.6mΩ
$R_{DS(on)typ. (TO-220)}$	4.8mΩ
I_D	140A
V_{th}	3V
$C_{iss@10V}$	4912pF
Q_{gd}	16nC



TO-263



TO-220



Marking & Packing Information

Part #	Package	Marking	Tube/Reel	Qty(pcs)
DSE054N10N3	TO-263	DSE054N10N3	Tape & Reel	800/box
DSG054N10N3	TO-220	DSG054N10N3	Tube	1000/box

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	100	V
Gate-Source voltage	V_{GS}	±20	V
Continuous drain current $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_D	140 99	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	560	A
Avalanche energy, single pulse ($L=0.5\text{mH}$, $R_g=25\Omega$) ^[1]	E_{AS}	600	mJ
Power dissipation $T_C = 25^\circ\text{C}$ $T_A = 25^\circ\text{C}$	P_{tot}	188	W
		2.0	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	°C

Notes:1.EAS was tested at $T_j = 25^\circ\text{C}$, $L = 0.5\text{mH}$, $I_d=34\text{A}$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.80	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	75	

Electrical Characteristic (at $T_j = 25^\circ\text{C}$, unless otherwise specified)

Static Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Drain-source breakdown voltage	BV_{DSS}	100	-	-	V	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	2.5	3.0	3.5	V	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$ $T_j=25^\circ\text{C}$
		-	-	100		$T_j=125^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=20\text{V}$, $V_{DS}=0\text{V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	4.6	5.4	mΩ	$V_{GS}=10\text{V}$, $I_D=60\text{A}$, TO-263
		-	4.8	5.6		TO-220
Transconductance	g_{fs}	-	116	-	S	$V_{DS}=5\text{V}$, $I_D=60\text{A}$

Dynamic Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Input Capacitance	C _{iss}	-	4912	-	pF	V _{GS} =0V, V _{DS} =50V, f=1MHz
Output Capacitance	C _{oss}	-	446	-		
Reverse Transfer Capacitance	C _{rss}	-	43	-		
Gate Total Charge	Q _G	-	76	-	nC	V _{GS} =10V, V _{DS} =50V, I _D =60A
Gate-Source charge	Q _{gs}	-	27	-		
Gate-Drain charge	Q _{gd}	-	16	-		
Gate plateau voltage	V _{plateau}	-	5.2	-	V	
Turn-on delay time	t _{d(on)}	-	19	-	ns	V _{GS} =10V, V _{DD} =50V, R _{G_ext} =3Ω, I _D =60A
Rise time	t _r	-	39	-		
Turn-off delay time	t _{d(off)}	-	42	-		
Fall time	t _f	-	20	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Diode Max Current	I_S		-	140	A	-
Diode Forward Voltage	V_{SD}	-	-	1.2	V	$V_{GS}=0V, I_{SD}=60A$
Diode Reverse Recovery Time	t_{rr}	-	50	-	ns	$T_j=25^\circ C, I_F=40A, dI/dt=100A/\mu s$
Diode Reverse Recovery Charge	Q_{rr}	-	58	-	nC	

Typical Characteristics Diagram

Fig1. Output Characteristics

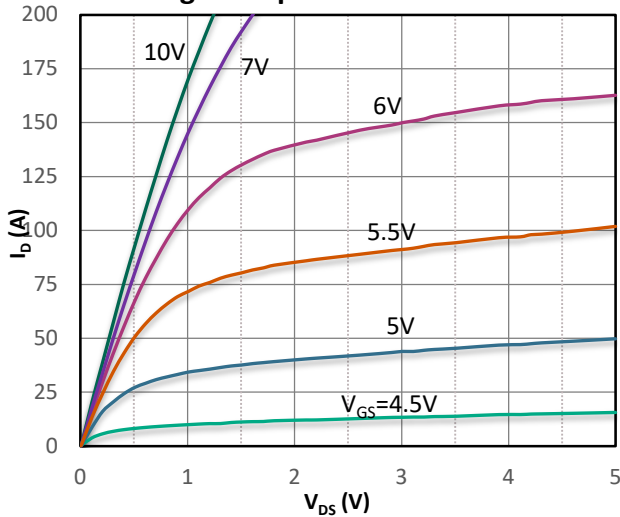


Fig2. Transfer Characteristics

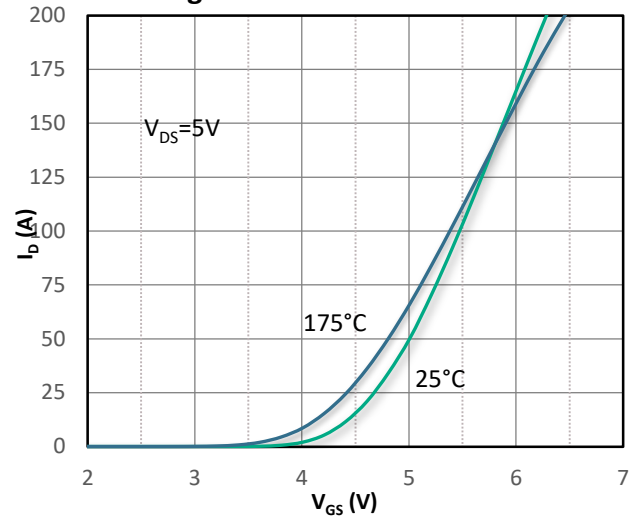


Fig3. Rds(on) vs Drain Current

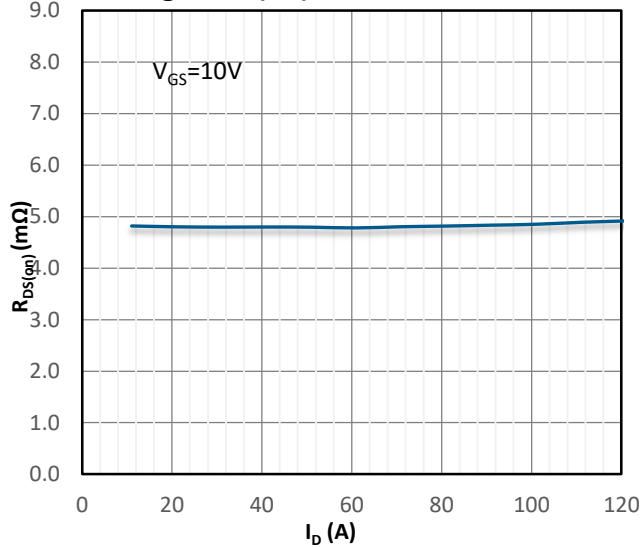


Fig 4. Rds(on) vs Gate Voltage

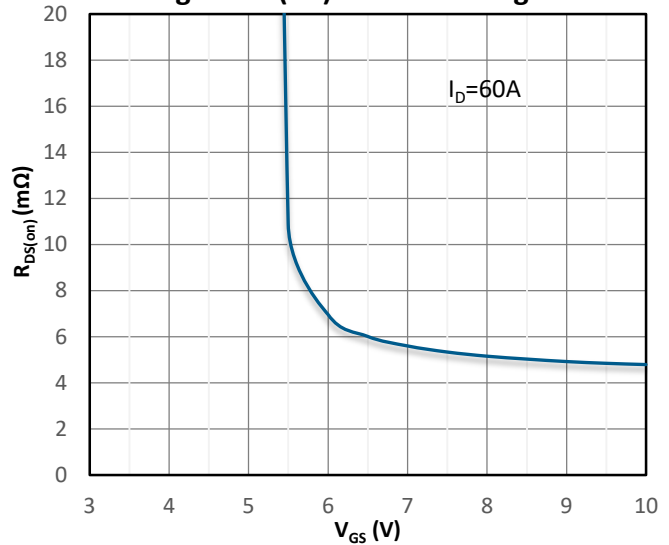


Fig5. Rds(on) vs. Temperature

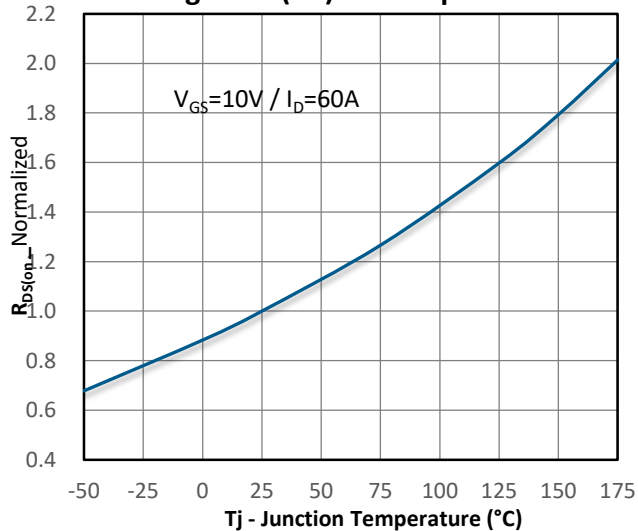
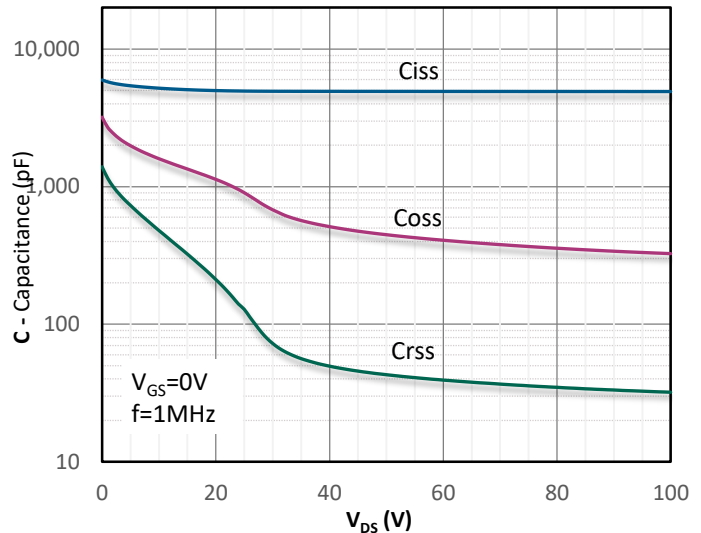


Fig6. Capacitance Characteristics



Typical Characteristics Diagram

Fig7. Gate Charge Characteristics

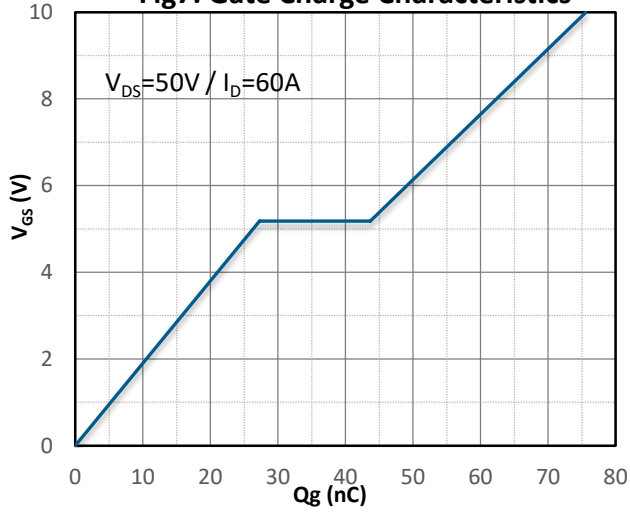


Fig8. Body-diode Forward Characteristics

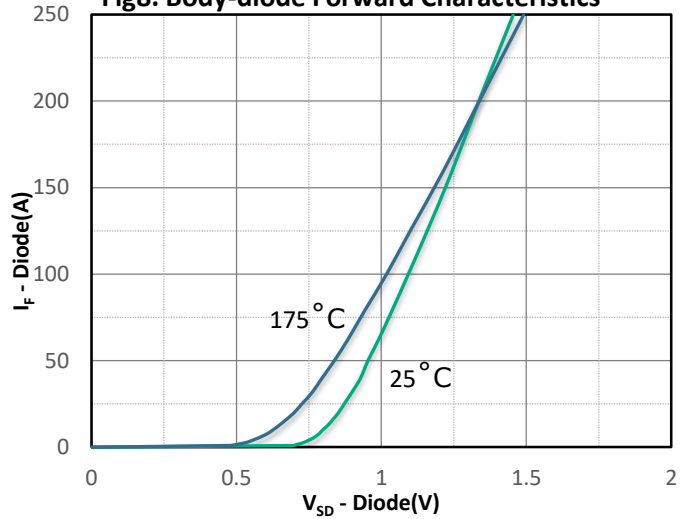


Fig9. Power De-rating

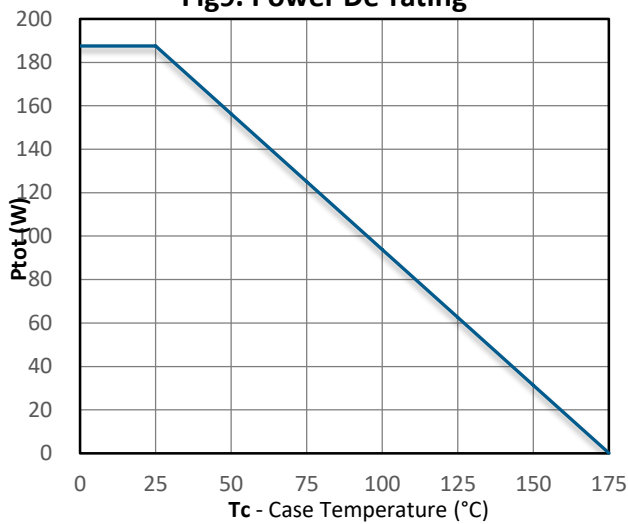


Fig10. Current De-rating

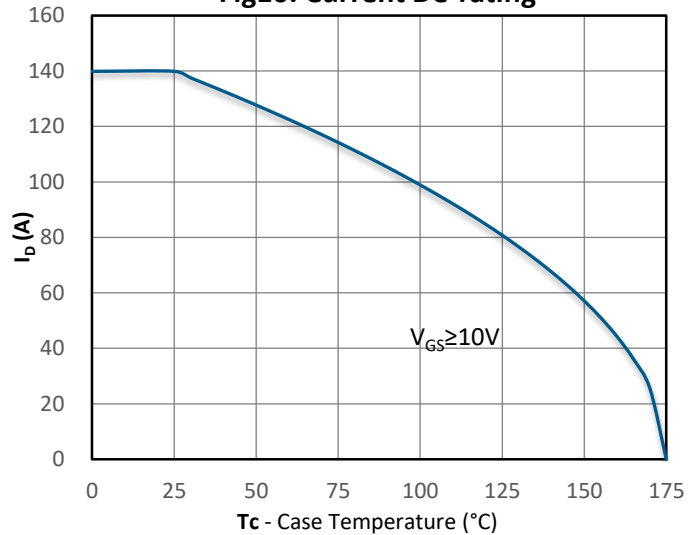


Fig11. Safe Operating Area

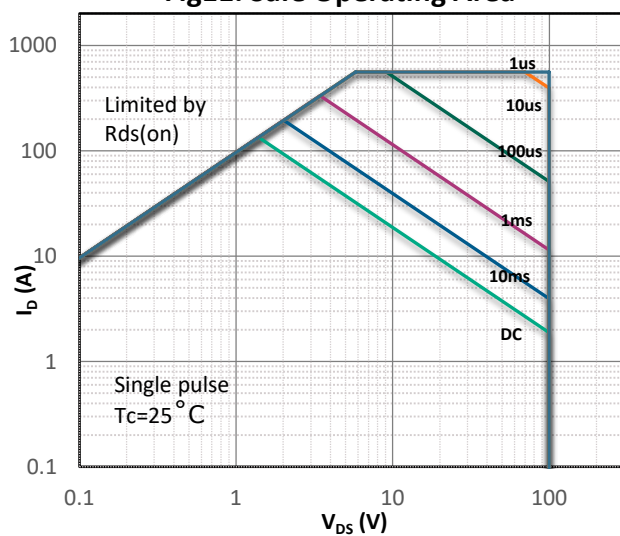
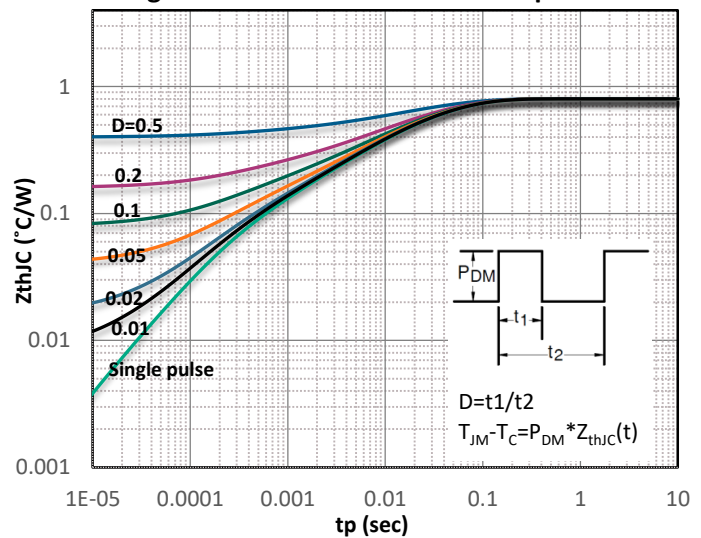
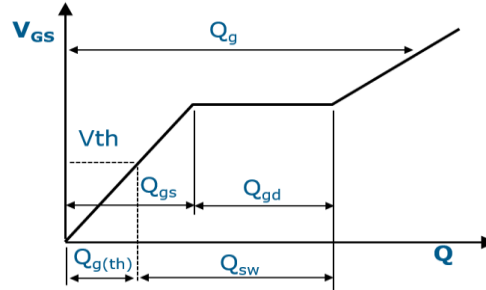
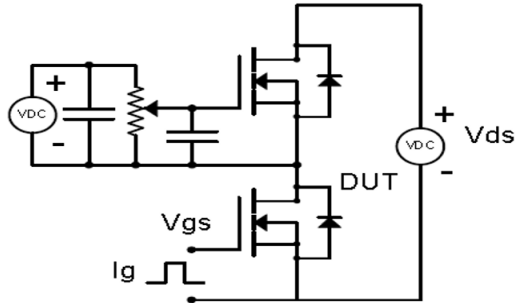


Fig12. Max. Transient Thermal Impedance

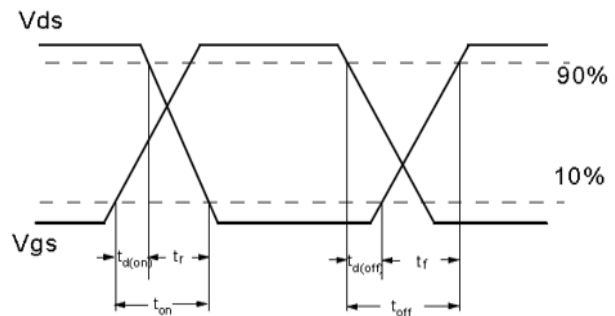
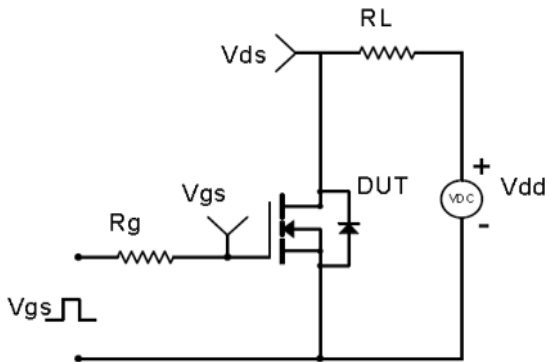


Test Circuit & Waveform

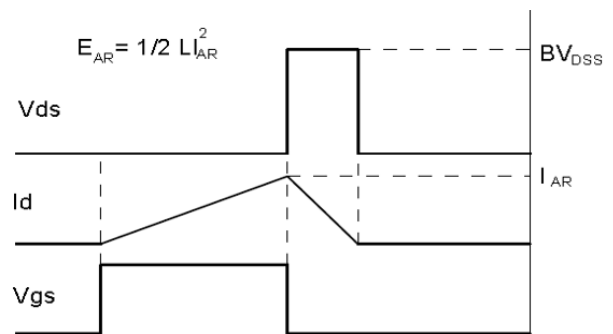
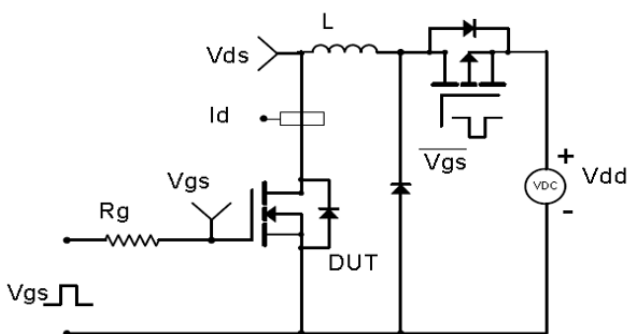
Gate Charge Test Circuit & Waveform



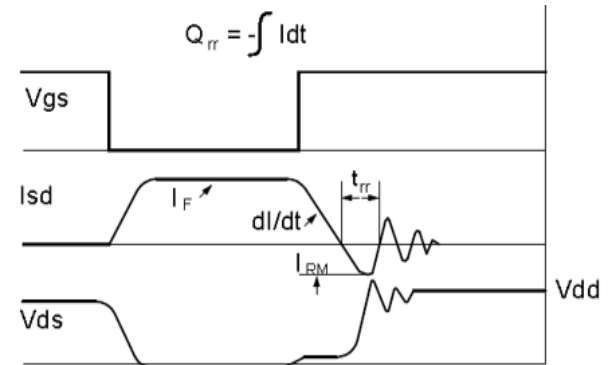
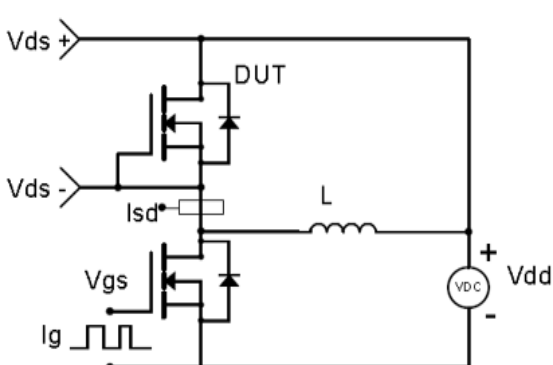
MOSFET Switching Test Circuit & Waveform



EAS Test Circuit & Waveform

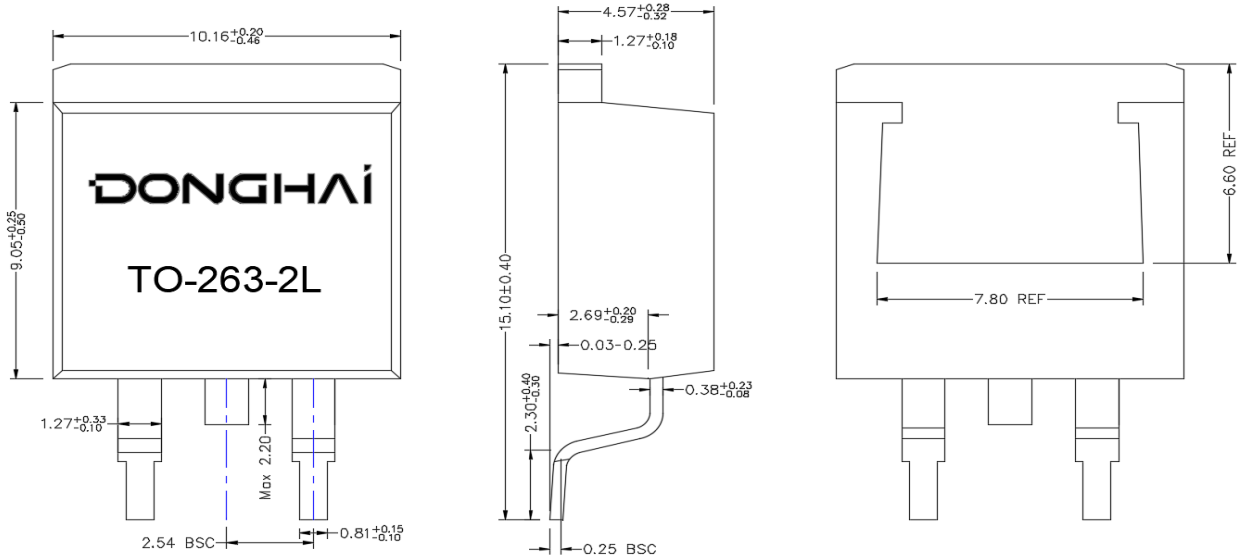


Diode Recovery Test Circuit & Waveform



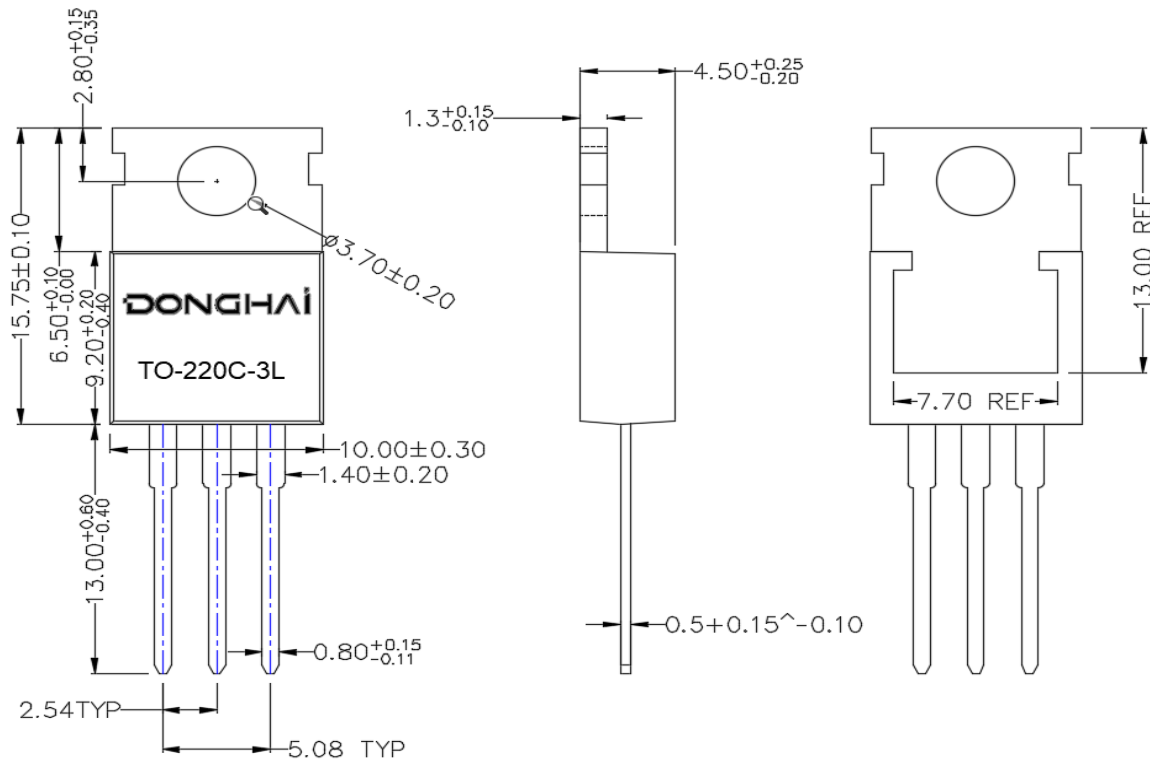
Package Outline : TO-263

*Dimensions in mm



Package Outline : TO-220

*Dimensions in mm



Revision History

Revision	Date	Major changes
1.0	2023/10/17	Release of formal version

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qualified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as aviation, aerospace, life-support devices or systems.

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