CRXSP25M065G2Q

SiC MOSFET 650V, 25mΩ, 97A

Features

- Qualified according to AEC Q101
- CRM G2 SIC MOSFET Technology
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggedness
- Fast Reverse Recovery

Product Summary

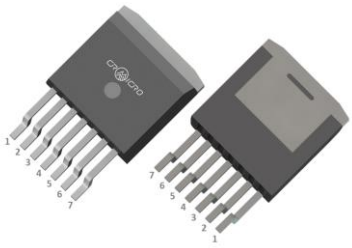
VDS	650V
$R_{DS(on)_typ}$	25mΩ
I_D	97A

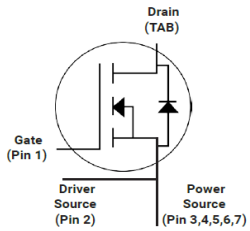
Applications

- Switching Mode Power Supply(SMPS)
- High Voltage DC/DC Converters
- On Board Charger(OBC)
- EV Charger

100% Avalanche Tested

RoHS HF





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Qty
CRXSP25M065G2Q	X25M065G2Q	TO-263-7	Reel	800pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DSmax}	650	V
Continuous drain current V_{GS}=15V, T_C = 25°C V_{GS}=15V, T_C = 100°C	I_D	 97 69	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D(pulse)}$	243	A
Avalanche energy, single pulse (L=10mH, Rg=25Ω)	E_{AS}	731	mJ
Gate-Source voltage (dynamic)[a1]	V_{GSmax}	-10/+22	V
Gate-Source voltage (static)[a2]	V_{GSop}	-5/+18	V
Power dissipation (T_C=25°C,T_J=175°C)	P_D	188	W
Operating Junction and Storage Temperature	T_j,T_{stg}	-55…175	°C

a1: When using MOSFET Body Diode V_{GSmax} = -5V/+22V

a2: MOSFET can also safely operate at 0/+18V

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Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.8	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	$V_{(BR)DSS}$	650	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	1.8	-	3.6	V	V_{DS}=V_{GS},I_D=15mA
Zero gate voltage drain current	I_{DSS}	- -	1 10	100 -	μA	VDS=650V,VGS=0V T_j=25°C T_j=175°C
Gate-source leakage current	I_{GSS}	-	-	250	nA	V_{GS}=20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	25 32.5	34 -	mΩ	VGS=15V, ID=33.5A, T_j=25°C T_j=175°C
Transconductance	g_{fs}	-	30	-	S	VDS=20V,IDS=33.5A
Dynamic Characteristic						
Internal Gate resistance	$R_{G(int)}$	-	1.7	-	Ω	f=1MHz
Input Capacitance	C_{iss}	-	2775	-	pF	V_{GS}=0V, V_{DS}=600V, f=1MHz
Output Capacitance	C_{oss}	-	231	-		
Reverse Transfer Capacitance	C_{rss}	-	16.3	-		
Coss Stored Energy	E_{oss}	-	45	-	uJ	
Gate Total Charge	Q_g	-	114	-	nC	VGS=-5/15V VDS=400V ID=33.5A
Gate-Source charge	Q_{gs}	-	41.5	-		
Gate-Drain charge	Q_{gd}	-	26	-		
Turn-on delay time	$t_{d(on)}$	-	48.5	-	ns	VDD=400V,ID=33.5A VGS=-5V/15V, RG=10Ω，L=100uH
Rise time	t_r	-	23	-		
Turn-off delay time	$t_{d(off)}$	-	68	-		
Fall time	t_f	-	20.6	-		
Turn-On Switching Energy	$E_{(on)}$	-	210	-	uJ	
Turn Off Switching Energy	$E_{(off)}$	-	26.6	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	3.5	-	V	VGS=0V,IF=16.7A
		-	3	-	V	VGS=0V,IF=16.7A, Tj=175℃
Continuous Diode Forward Current	I_S	-	-	97	A	V_{GS}=0V
Diode pulse Current	$I_{S,pulse}$	-	-	243	A	pulse width t_P limited by Tjmax
Body Diode Reverse Recovery Time	t_{rr}	-	21.3	-	ns	di/dt=1000A/us IF=33.5A Vdd=400V Tj=25℃
Body Diode Reverse Recovery Charge	Q_{rr}	-	138	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	11	-	A	
Body Diode Reverse Recovery Time	t_{rr}	-	27.7	-	ns	di/dt=1000A/us IF=33.5A Vdd=400V Tj=175℃
Body Diode Reverse Recovery Charge	Q_{rr}	-	242	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	15.2	-	A	

Typical Performance Characteristics

Fig 1. Output Characteristics (Tj=-55℃)

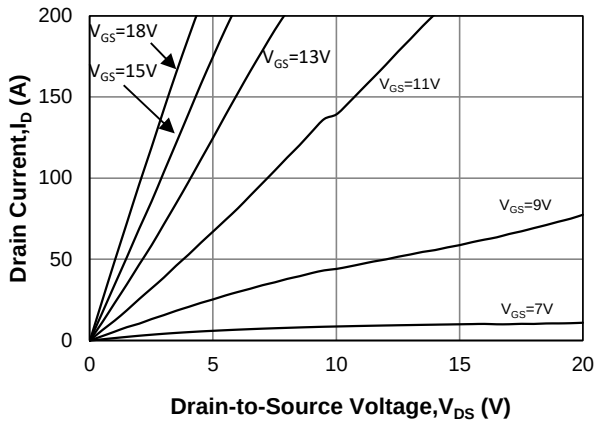


Fig 2. Output Characteristics (Tj=25℃)

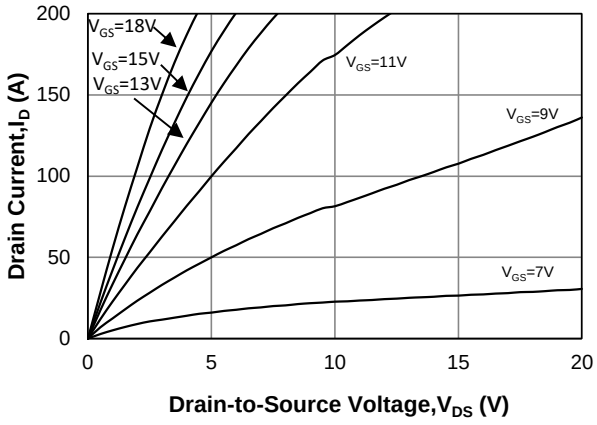


Fig 3. Output Characteristics (Tj=175℃)

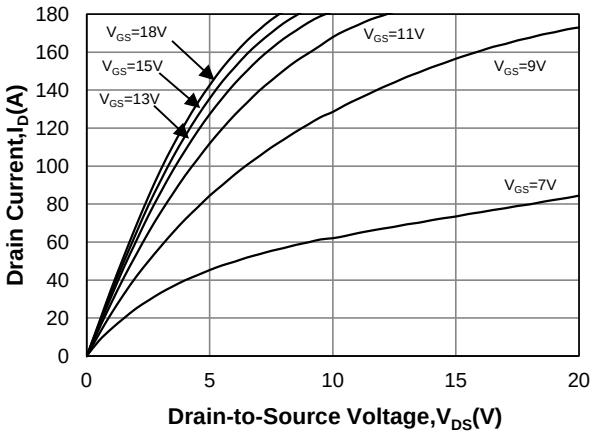


Fig 4: Rds(on) vs. Temperature

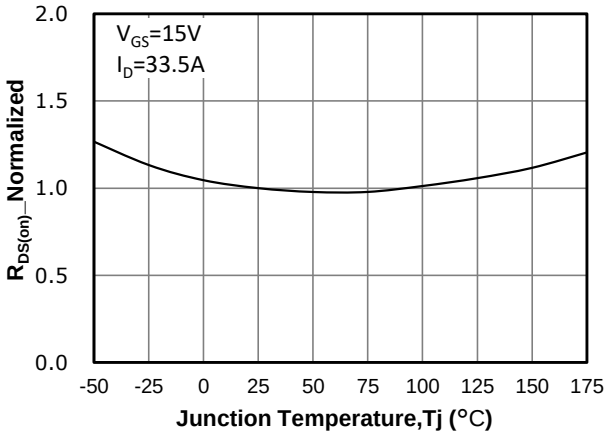


Fig 5: On-Resistance vs. Drain Current For Various Temperatures

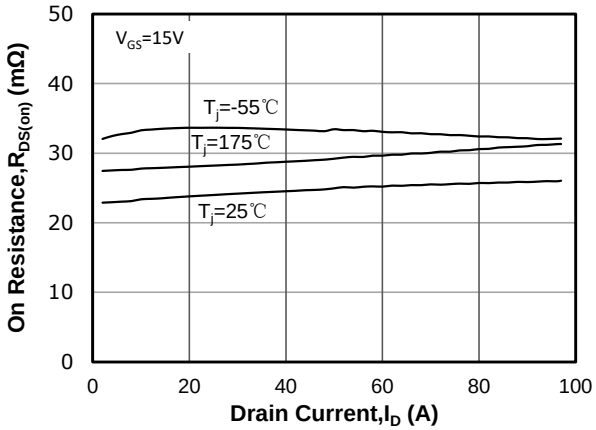


Fig 6: Rds(on) vs. Temperature For Various Gate Voltage

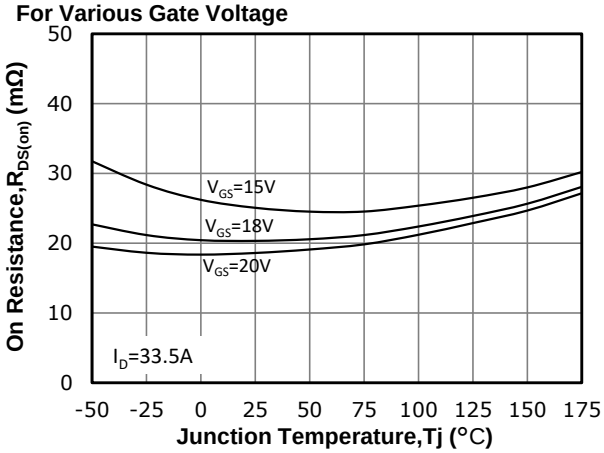


Fig 7: Transfer Characteristics

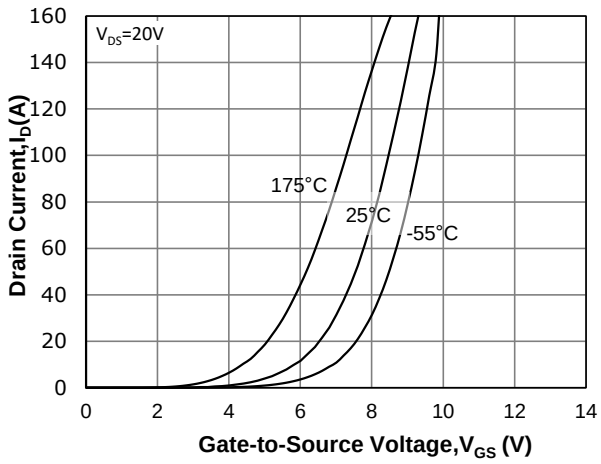


Fig 8: Body-diode Forward Characteristics For Various Temperatures

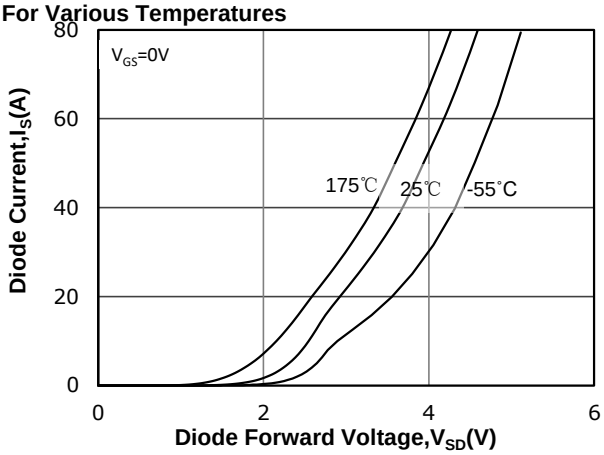


Fig 9: VGS(th) Vs Tj Characteristics

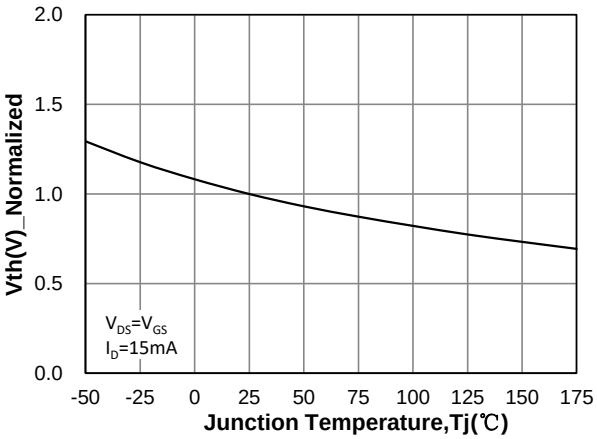


Fig 10: 3rd Quadrant Characteristic at 25℃

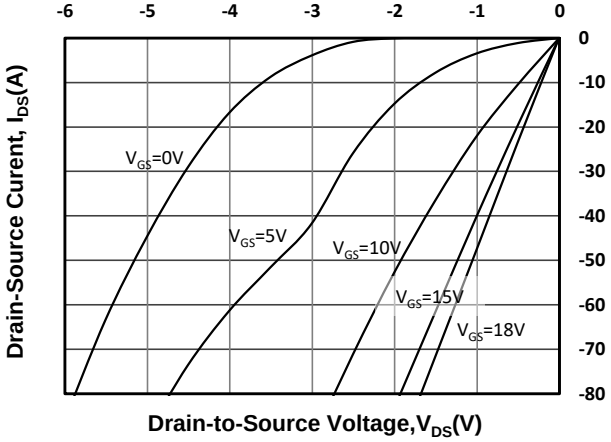


Fig 11：Gtate Charge Characteristics

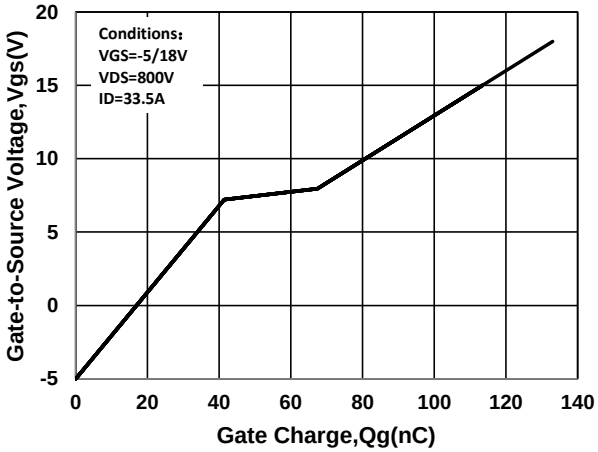


Fig 12: Capacitance Characteristics

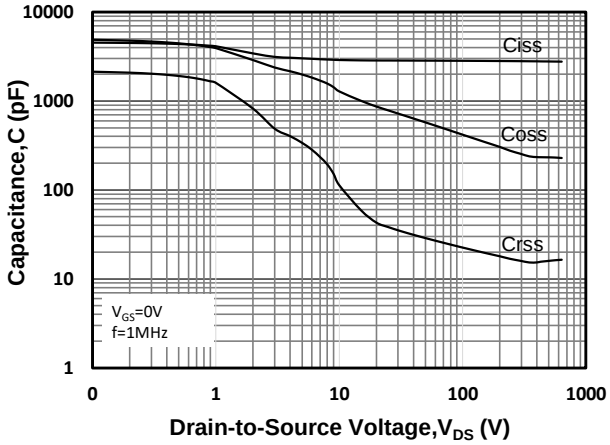


Fig 13: Continuous Drain Current vs. Case Temperature

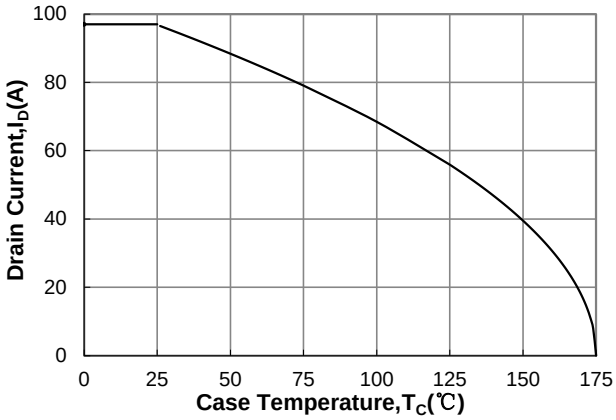


Fig 14: Maximum Power Dissipation vs. Case Temperature

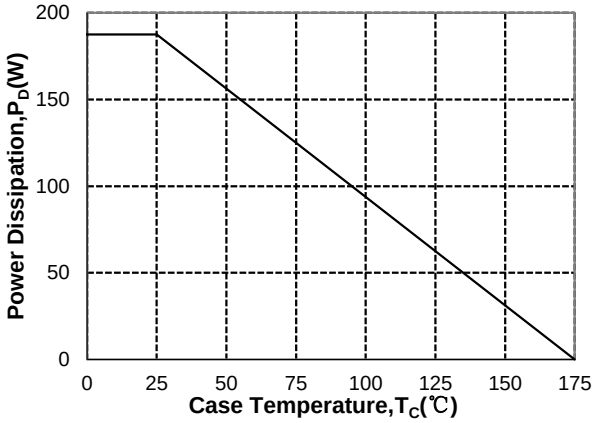


Fig 15: Safe Operating Area

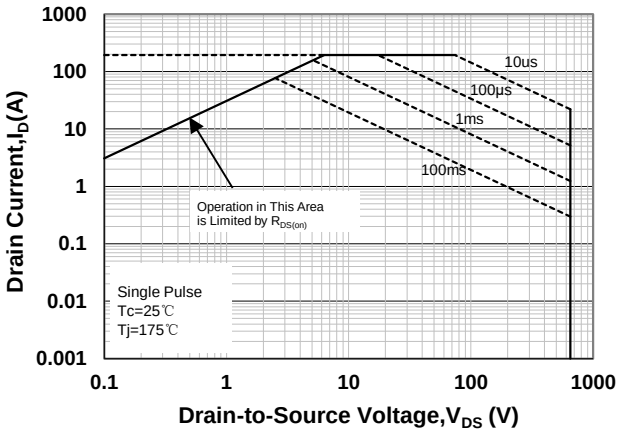


Fig 16:Output Capacitor Stored Energy

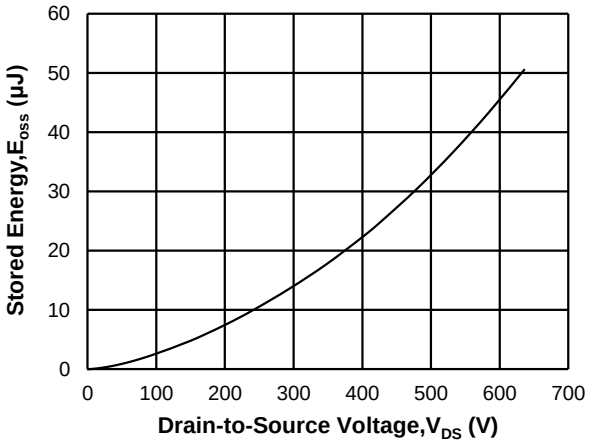
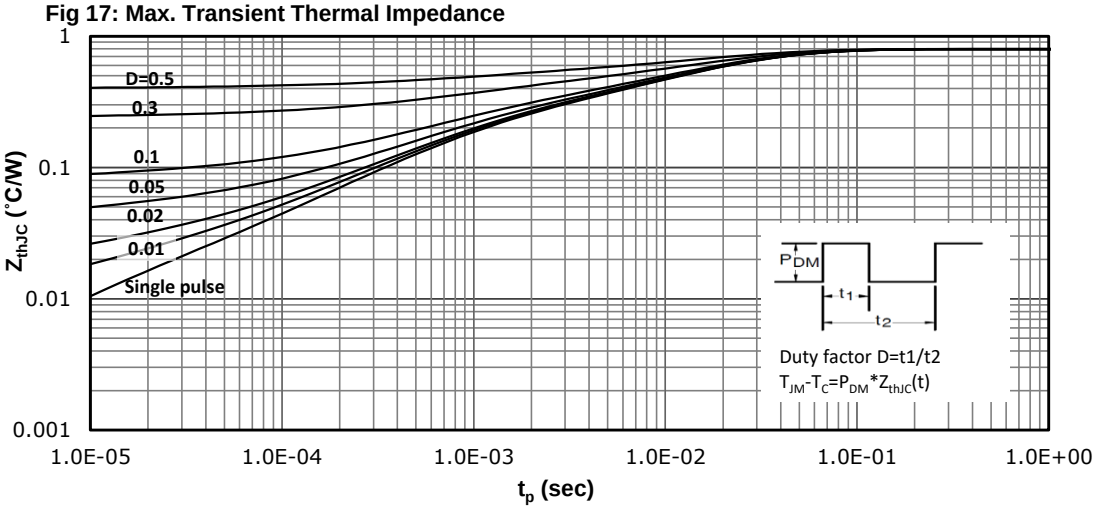
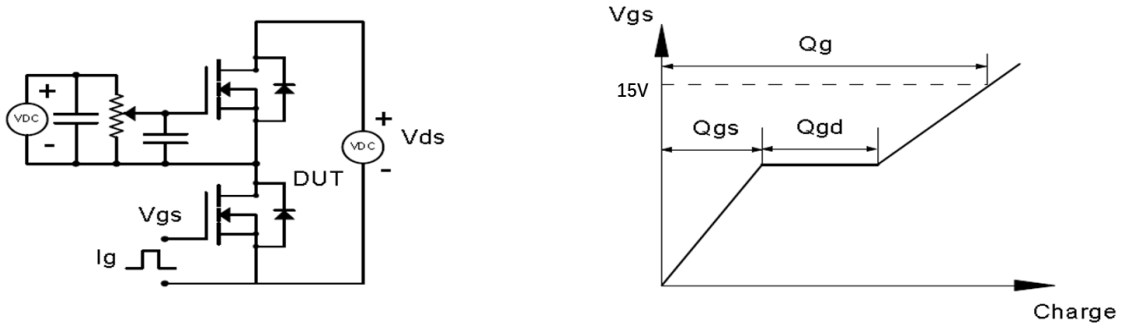


Fig 17: Max. Transient Thermal Impedance

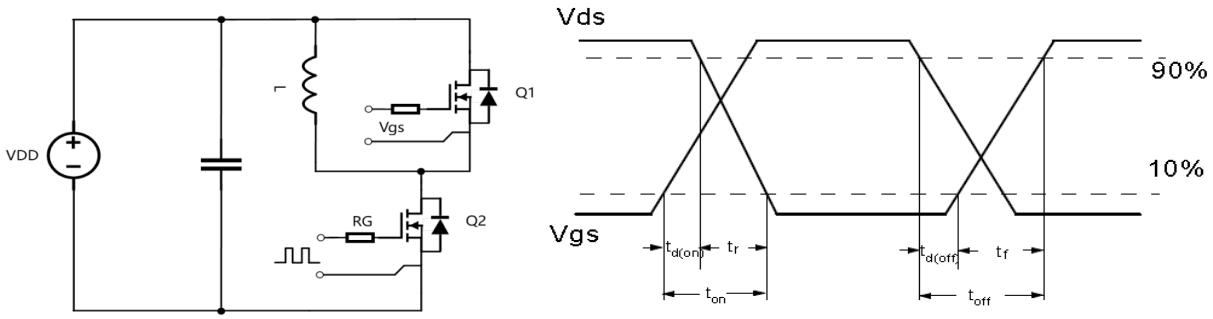


Test Circuit & Waveform

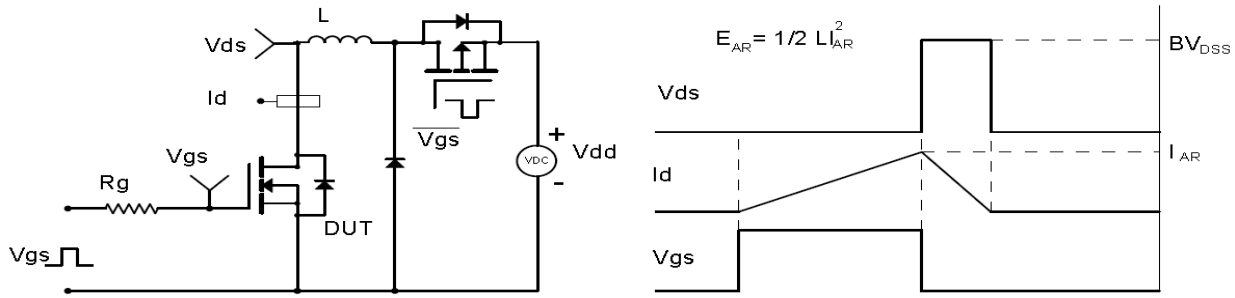
Gate Charge Test Circuit & Waveform



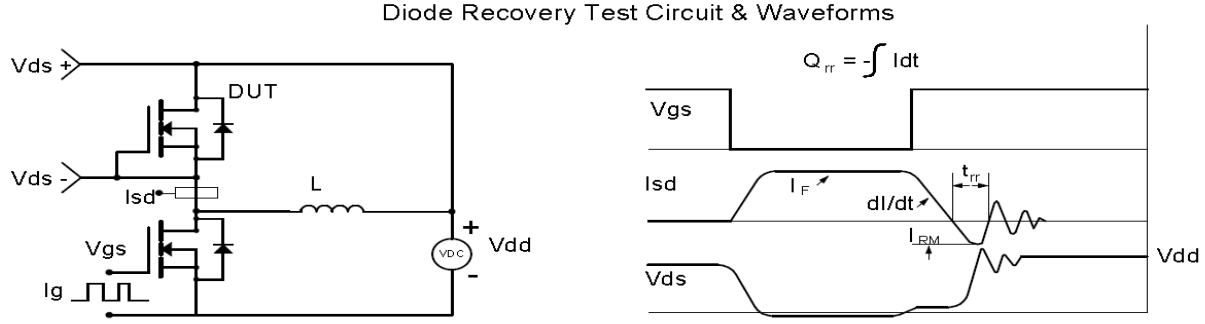
Resistive Switching Test Circuit & Waveforms



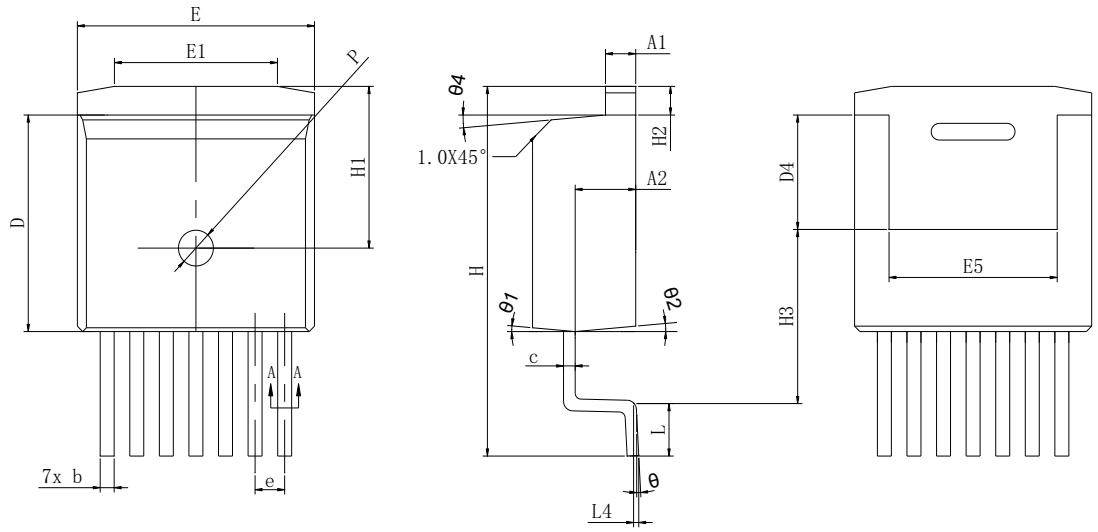
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-263US-7



Items	Values(mm)	
	MIN	MAX
A	4.2	4.6
A1	1.1	1.4
A2	2.4	2.8
A3	0	0.3
b	0.5	0.8
c	0.4	0.7
D	8.8	9.3
D4	4.5	5.05
e	1.27BSC	
E	9.8	10.4
E1	6.5	7.5
E5	6.72	7.72
H	14.8	16.2
H1	6.38	7.18
H2	0.9	1.5
H3	6.8	7.8
L	1.8	2.6
L4	0.25	
P	1.3	1.7
θ	0°	10°
θ1	2°	9°
θ2	2°	9°
θ4	2°	9°

Revision History

Revison	Date	Major changes
1.0	2024/6/4	Release of formal version

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