

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

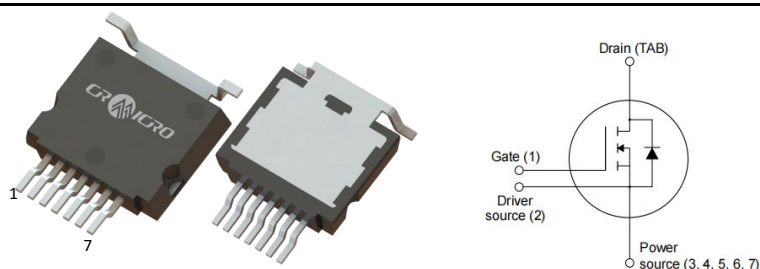
Applications

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

Product Summary

V _{DS}	650V
R _{DS(on)_typ}	45m Ω
I _D	49A

100% Avalanche Tested



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Qty
CRXSH45M065G2Q	X45M065G2Q	T2PAK	Reel	700

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DS}	650	V
Continuous drain current V _{GS} =15V, T _C = 25°C V _{GS} =15V, T _C = 100°C	I _D	49 35	A
Pulsed drain current (T _C = 25°C, t _p limited by T _{Jmax})	I _{D(pulse)}	123	A
Avalanche energy, single pulse (L=10mH, R _g =25 Ω)	E _{AS}	605	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	165	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

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.91	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

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

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	$V_{(BR)DSS}$	650	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	1.8	-	3.6	V	$V_{DS}=V_{GS}, I_D=7mA$
Zero gate voltage drain current	I_{DSS}	-	1	100	μA	$V_{DS}=650V, V_{GS}=0V$ $T_j=25^\circ\text{C}$
		-	10	-		$T_j=175^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=-10/+22V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	45	60	mΩ	$V_{GS}=15V, I_D=17.6A,$ $T_j=25^\circ\text{C}$
		-	58.5	-		$T_j=175^\circ\text{C}$
Drain-source on-state resistance	$R_{DS(on)}$	-	35	50	mΩ	$V_{GS}=18V, I_D=17.6A,$ $T_j=25^\circ\text{C}$
		-	45.5	-		$T_j=175^\circ\text{C}$
Transconductance	g_{fs}	-	16.7	-	S	$V_{DS}=20V, I_{DS}=17.6A$

Dynamic Characteristic

Internal Gate resistance	R _{G(int)}	-	1.7	-	Ω	f=1MHz
Input Capacitance	C _{iss}	-	1595	-	pF	V _{GS} =0V, V _{DS} =600V, f=1MHz
Output Capacitance	C _{oss}	-	130	-		
Reverse Transfer Capacitance	C _{rss}	-	10.4	-		
Coss Stored Energy	E _{oss}	-	25	-	uJ	
Gate Total Charge	Q _g	-	74	-	nC	VGS=-5/18V VDS=400V ID=17.6A
Gate-Source charge	Q _{gs}	-	23.5	-		
Gate-Drain charge	Q _{gd}	-	15.8	-		
Turn-on delay time	t _{d(on)}	-	29.4	-	ns	VDD=400V,ID=17.6A VGS=-5V/15V, RG=2.5Ω, L=200uH
Rise time	t _r	-	3.8	-		
Turn-off delay time	t _{d(off)}	-	25	-		
Fall time	t _f	-	6.7	-		
Turn-On Switching Energy	E _(on)	-	36.2	-	uJ	
Turn Off Switching Energy	E _(off)	-	29.7	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	3.5	-	V	$V_{GS}=0V, I_F=8.8A$
		-	3.0	-	V	$V_{GS}=0V, I_F=8.8A, T_J=175^{\circ}C$
Continuous Diode Forward Current	I_S	-	-	49	A	$V_{GS}=0V$
Diode pulse Current	$I_{S,pulse}$	-	-	123	A	pulse width t_p limited by T_{Jmax}
Body Diode Reverse Recovery Time	t_{rr}	-	16	-	ns	$di/dt=1200A/us$ $I_F=17.6A$ $V_{dd}=400V$ $T_J=25^{\circ}C$
Body Diode Reverse Recovery Charge	Q_{rr}	-	87	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	9.5	-	A	
Body Diode Reverse Recovery Time	t_{rr}	-	24	-	ns	$di/dt=1200A/us$ $I_F=17.6A$ $V_{dd}=400V$ $T_J=175^{\circ}C$
Body Diode Reverse Recovery Charge	Q_{rr}	-	160	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	11.8	-	A	

Typical Performance Characteristics

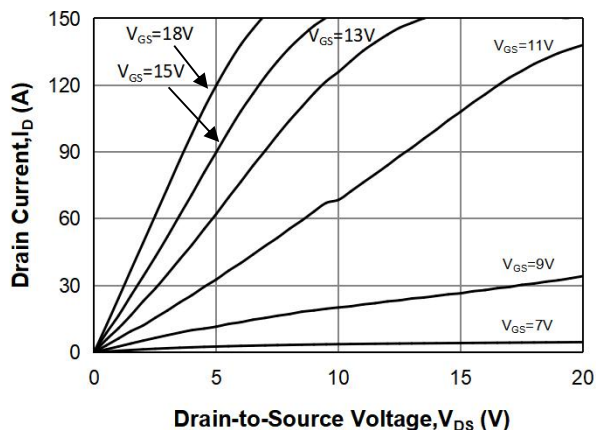
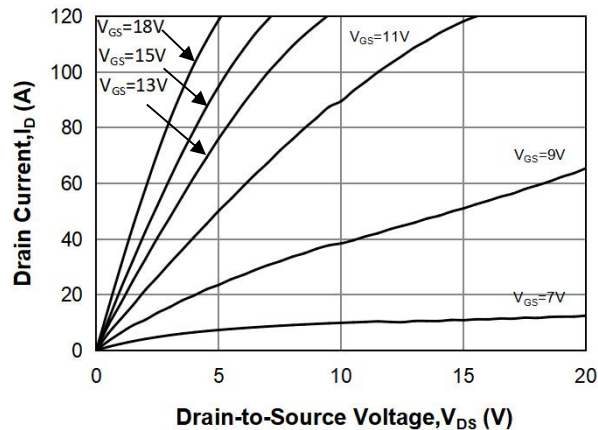
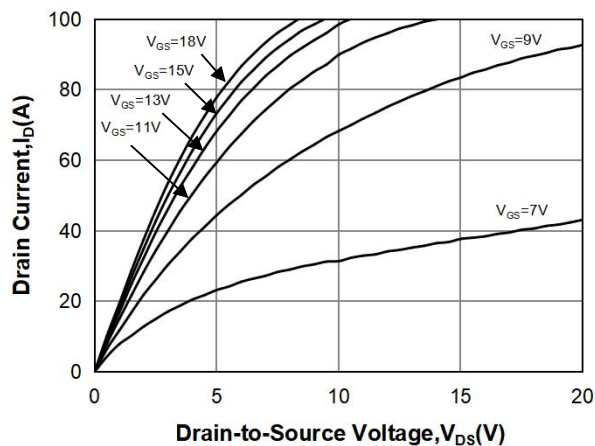
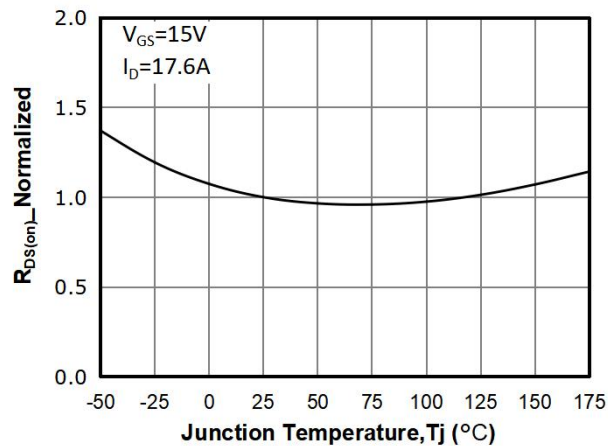
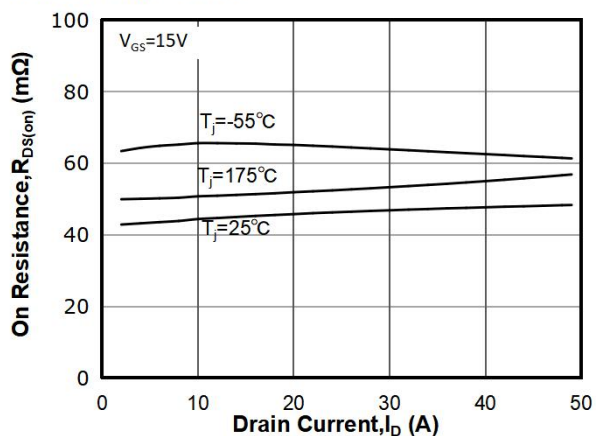
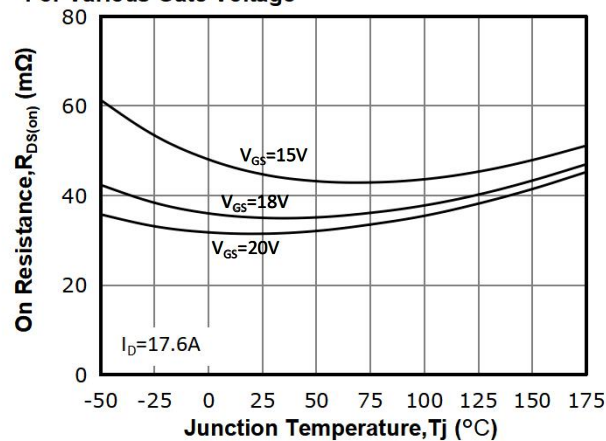
Fig 1. Output Characteristics ($T_j = -55^\circ\text{C}$)

Fig 2. Output Characteristics ($T_j = 25^\circ\text{C}$)

Fig 3. Output Characteristics ($T_j = 175^\circ\text{C}$)

Fig 4: $R_{DS(on)}$ vs. Temperature

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

Fig 6: $R_{DS(on)}$ vs. Temperature For Various Gate Voltage


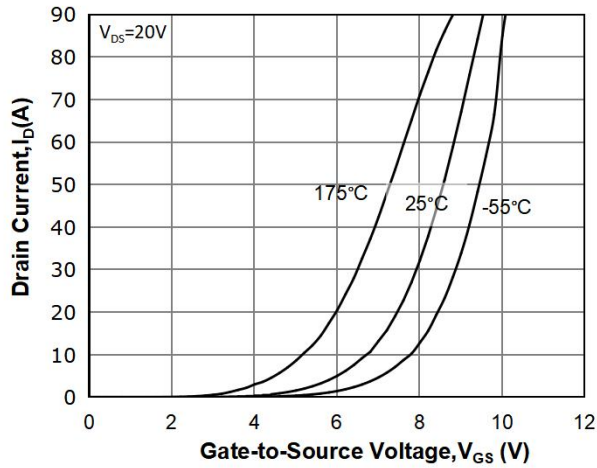
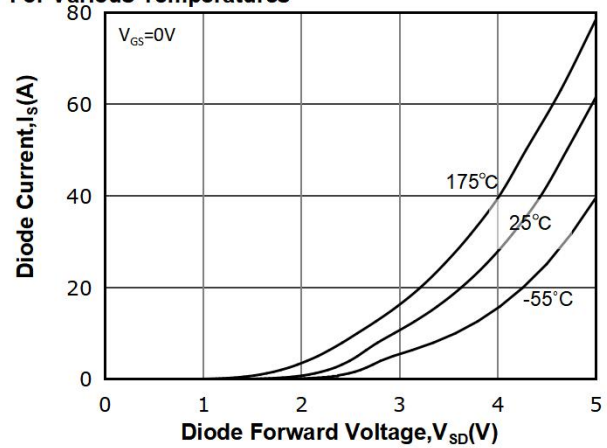
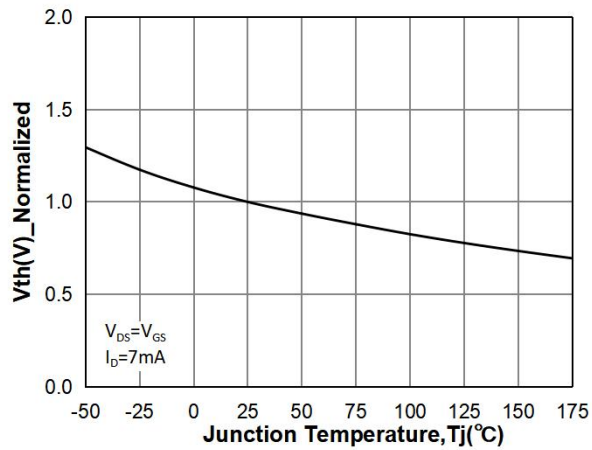
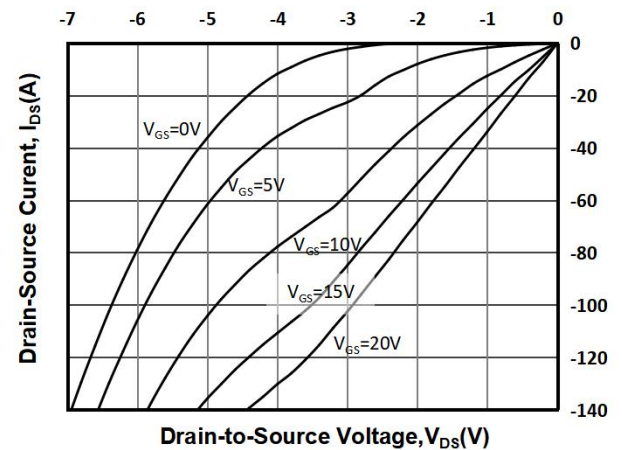
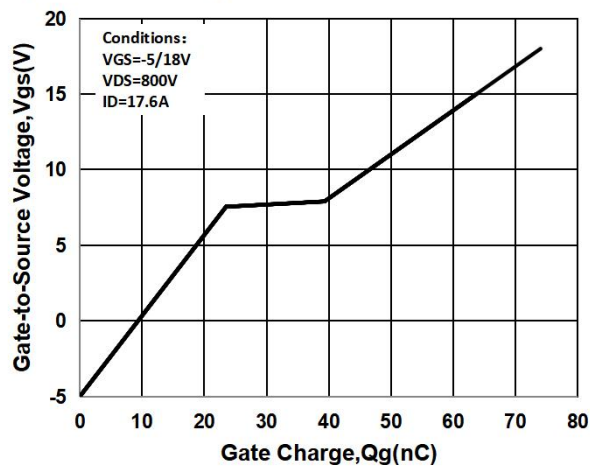
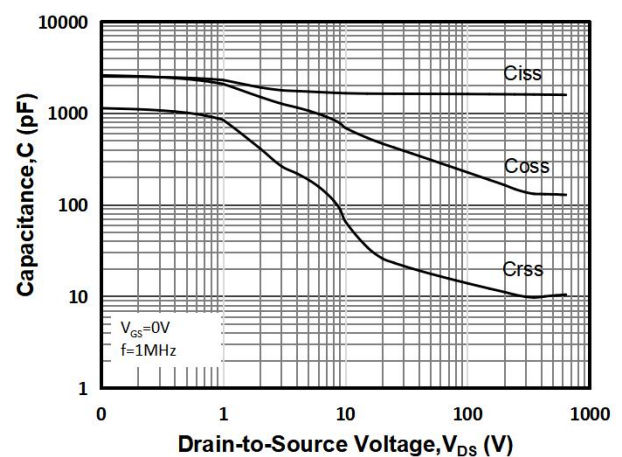
Fig 7: Transfer Characteristics

Fig 8: Body-diode Forward Characteristics For Various Temperatures

Fig 9: V_GS(th) Vs T_J Characteristics

Fig 10: 3rd Quadrant Characteristic at 25°C

Fig 11: Gate Charge Characteristics

Fig 12: Capacitance Characteristics


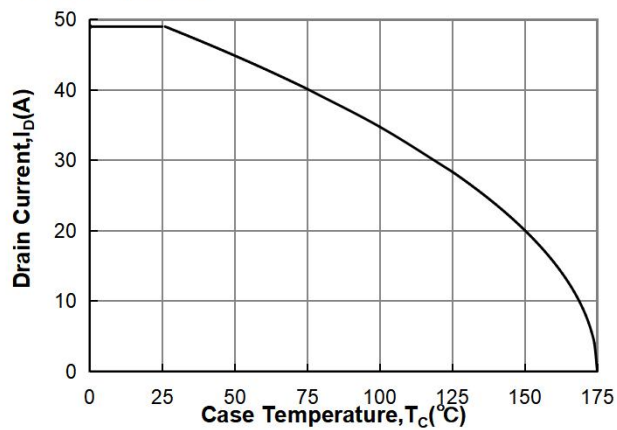
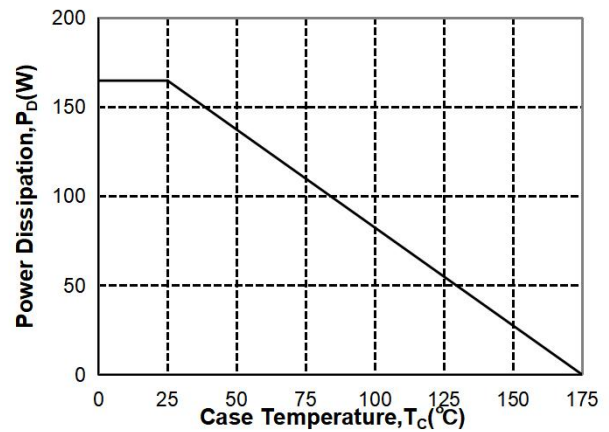
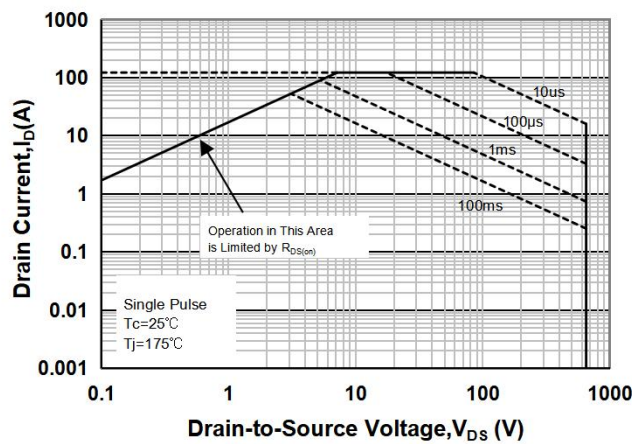
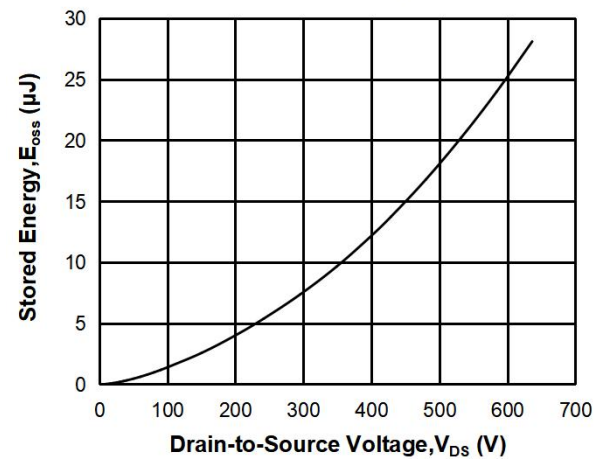
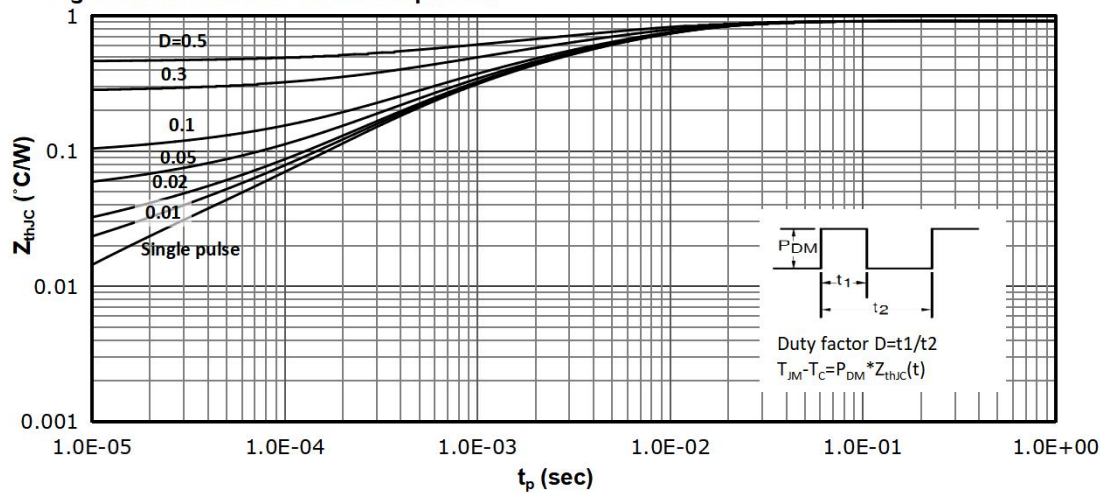
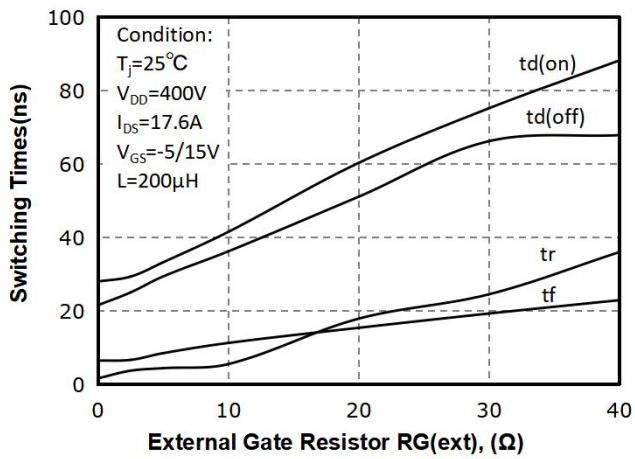
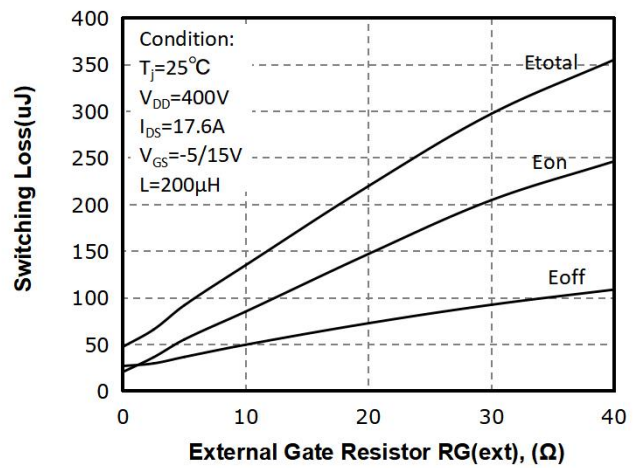
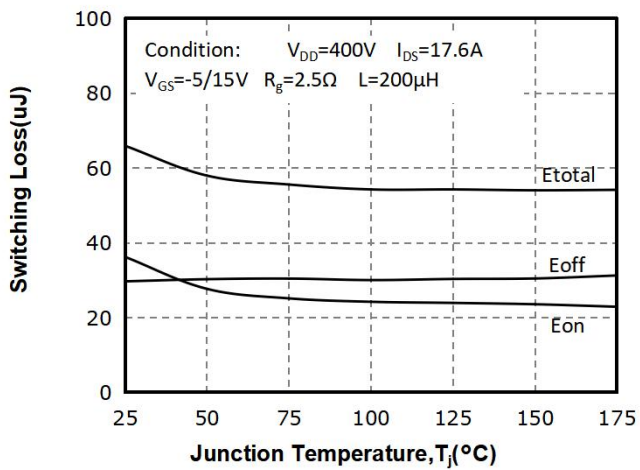
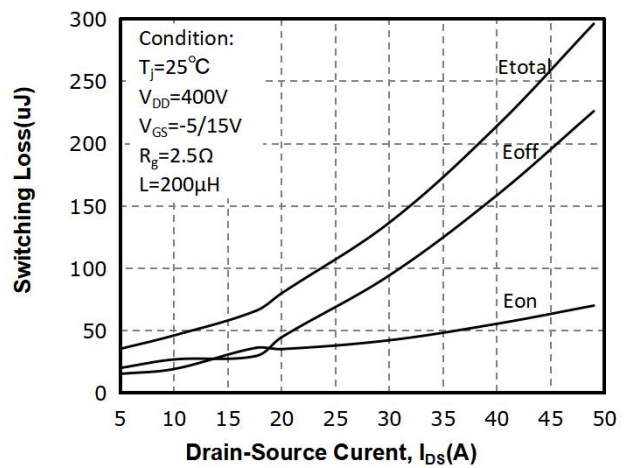
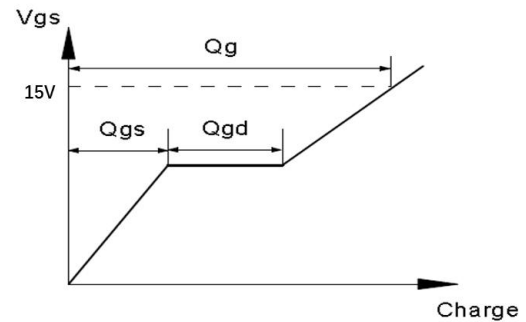
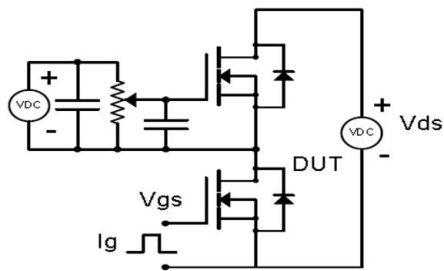
Fig 13: Continuous Drain Current vs. Case Temperature

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


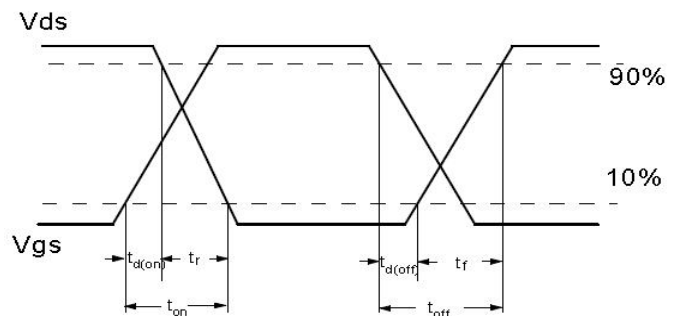
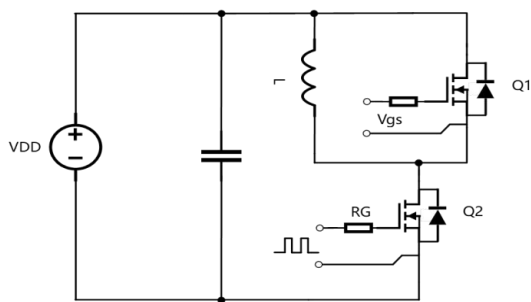
Fig 18: $R_g(\Omega)$ vs. Switching Times(us)

Fig 19: $R_g(\Omega)$ vs. Switching Loss(uJ)

Fig 20: Temperature(°C) vs. Switching Loss(uJ)

Fig 21: $I_{DS}(\text{A})$ vs. Switching Loss(uJ)


Test Circuit & Waveform

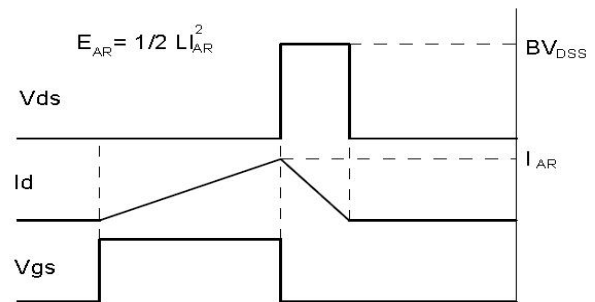
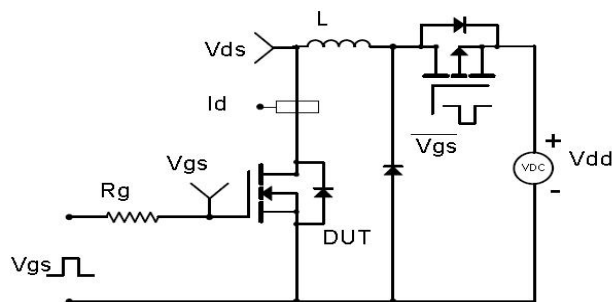
Gate Charge Test Circuit & Waveform



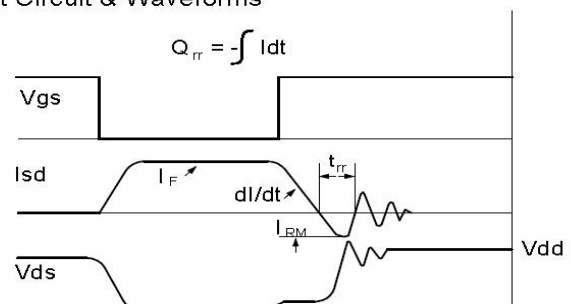
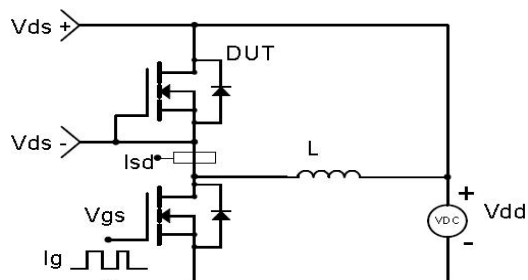
Resistive Switching Test Circuit & Waveforms

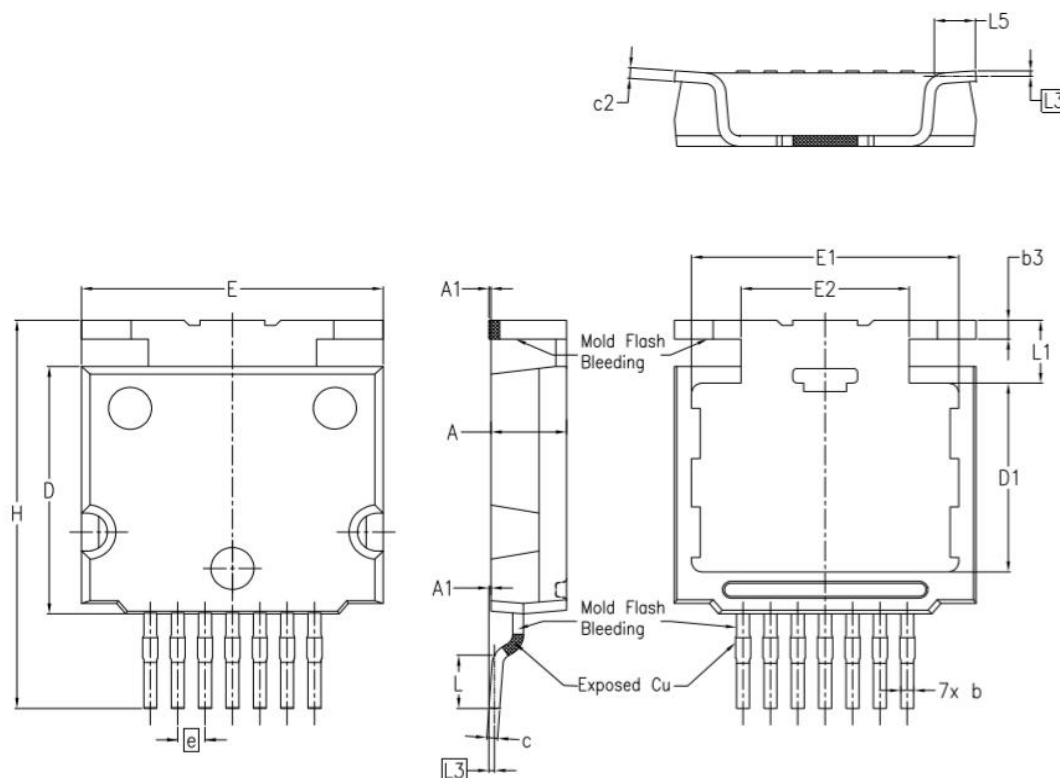


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: T2PAK


Items	Values(mm)	
	MIN	MAX
A	3.4	3.6
A1	0	0.25
b	0.5	0.7
b3	0.75	1.05
c	0.4	0.6
c2	0.4	0.6
D	11.65	11.95
D1	8.75	9.15
E	13.85	14.15
E1	12.25	12.55
E2	7.7	7.9
e	1.27 BSC	
H	17.9	19.1
L	2.25	2.8
L1	3.05BSC	
L3	0.26BSC	
L5	1.7	2.15

Revision History

Revision	Date	Major changes
1.0	2025/5/26	Release of formal version

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