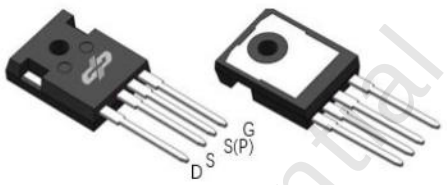
DPM120R080K4G1

N-Channel Silicon Carbide MOSFET

Product Summary

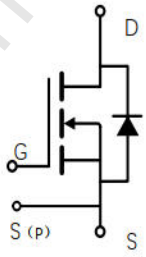
Part #	V_{DS}	$R_{DS(on)}$	I_D (T_c=25℃)
DPM120R080K4G1	1200V	56mΩ	45A

TO247-4L



Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to parallel
- RoHS Compliant



Applications

- General purpose drives
- Energy storage systems
- String inverter
- Uninterruptible power supplies

Package Marking and Ordering Information

Part #	Marking	Package	Packing
DPM120R080K4G1	M120R080	TO247-4L	Tube

Halogen-Free

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current (V_{GS}=18V) T_C = 25°C T_C = 100°C	I_D	 45 32	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	135	A
Gate-source voltage, max. transient voltage	V_{GSmax}	-8/+22	V
Gate-source voltage, max. static voltage	V_{GSop}	-4/+18	V
Power dissipation (T_C = 25°C) Power dissipation (T_C = 100°C)	P_{tot}	250 125	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-40...+175	°C

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.6	°C/W

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

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	1200	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2	2.8 2.1	4	V	V_{DS}=V_{GS},I_D=5mA T_j=25°C T_j=175°C
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	V_{DS}=1200V,V_{GS}=0V T_j=25°C
Gate-source leakage current	I_{GSS}	-	-	250	nA	V_{GS}=18V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	56 90	76	mΩ	V_{GS}=18V, I_D=20A T_j=25°C T_j=175°C
Gate resistance	R_g	-	1	-	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz
Dynamic Characteristic[2]						
Input Capacitance	C_{iss}	-	2385	-	pF	V_{GS}=0V, V_{DS}=1000V, f=1MHz
Output Capacitance	C_{oss}	-	81	-		
Reverse Transfer Capacitance	C_{rss}	-	6	-		
Gate Total Charge	Q_g	-	103	-	nC	V_{GS}=-4/18V, V_{DS}=800V, I_D=20A, f=1MHz
Gate-Source charge	Q_{gs}	-	29	-		
Gate-Drain charge	Q_{gd}	-	36	-		
Turn-on delay time	$t_{d(on)}$	-	14	-	ns	V_{GS}=-4/18V, ID=20A, V_{DD}=800V, R_{G_ext}=2.5Ω L=200μH
Rise time	t_r	-	10	-		
Turn-off delay time	$t_{d(off)}$	-	23	-		
Fall time	t_f	-	9	-		
Turn-On Energy	E_{on}	-	135	-	μJ	
Turn-Off Energy	E_{off}	-	32	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	4.5 4.1	6.1	V	V_{GS}=-4V,I_{SD}=20A T_j=25°C T_j=175°C
Diode continuous forward current	I_s		43 23	- -	A	V_{GS}=-4V T_C = 25°C T_C = 100°C
Diode Peak reverse recovery Current	I_{rrm}	-	18	-	A	VGS=-4V,V_R=800V I_{SD}=20A, dI/dt=5000A/μs
Body Diode Reverse Recovery Time[2]	t_{rr}	-	8	-	ns	
Body Diode Reverse Recovery Charge[2]	Q_{rr}	-	95	-	nC	

[2]. Defined by design. Not subject to production test

Typical Performance Characteristics

Fig 1: Output Characteristics
Tj=-40 ℃

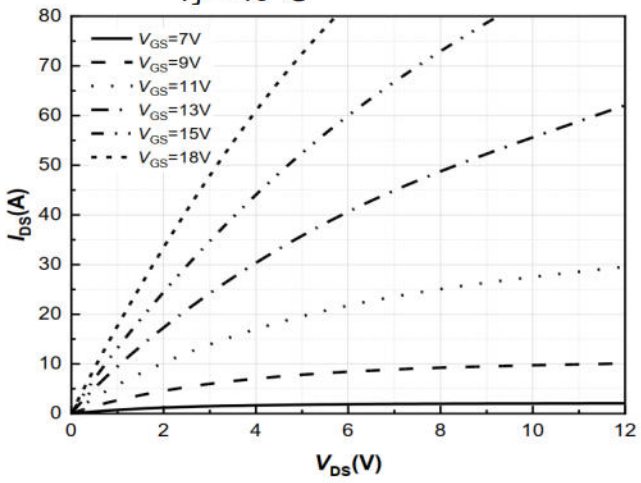


Fig 2: Output Characteristics
Tj=25℃

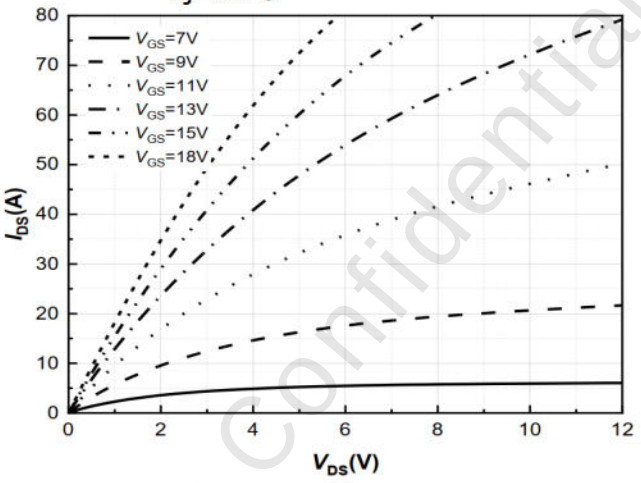


Fig 3: Output Characteristics
Tj=175℃

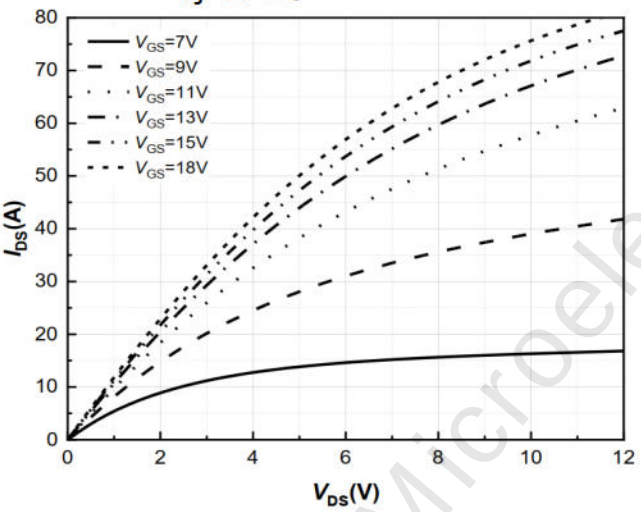


Fig 4: Rds(on) vs Temperature

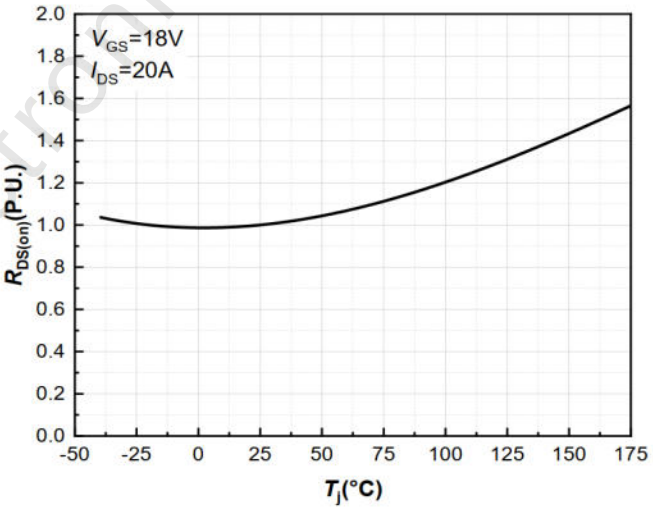


Fig 5: Rds(on) vs Drain Current for various Temperature

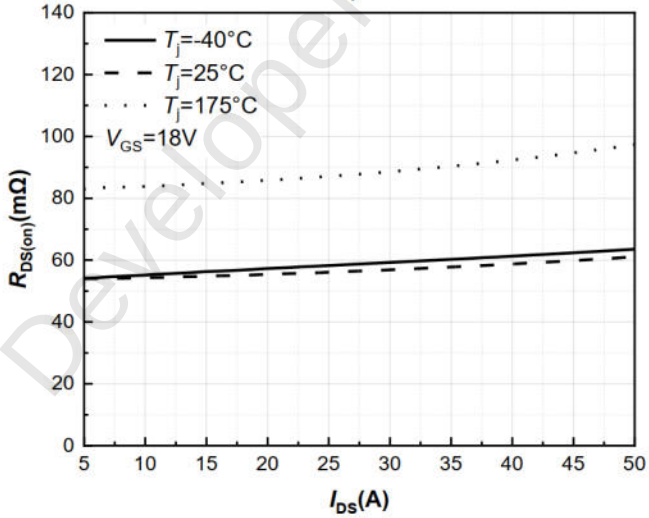
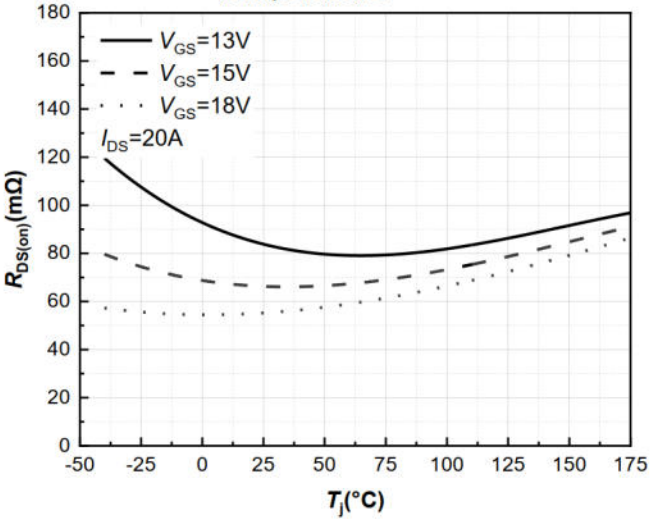


Fig 7: Rds(on) vs. Gate Voltage at Temperature



Typical Performance Characteristics

Fig 7: Transfer Characteristics

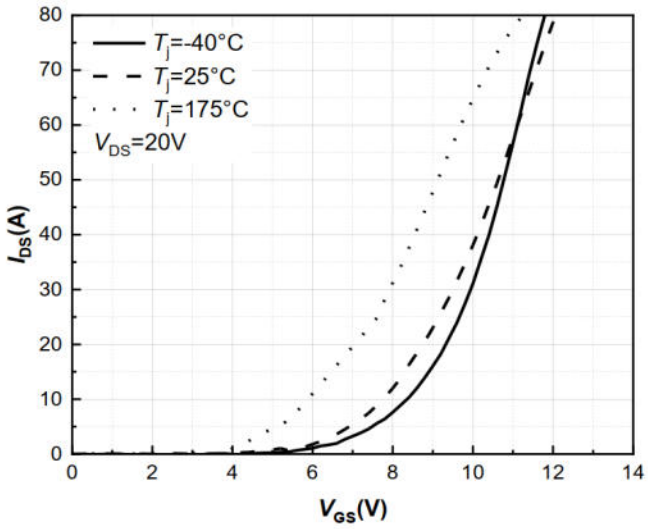


Fig 8: Body Diode Characteristic Tj=-40℃

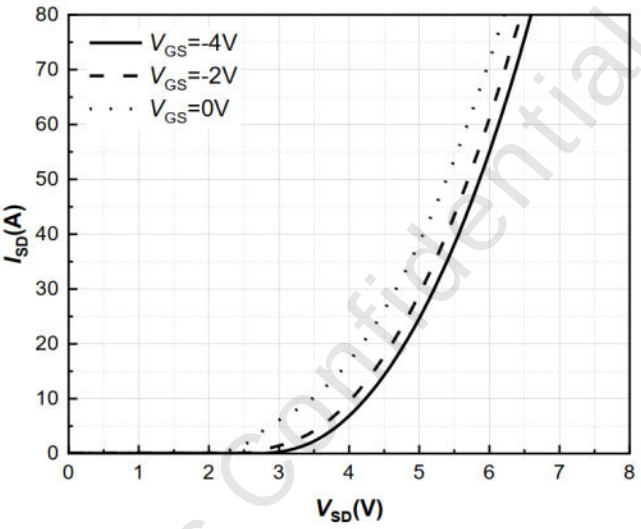


Fig 9: Body Diode Characteristic Tj=25℃

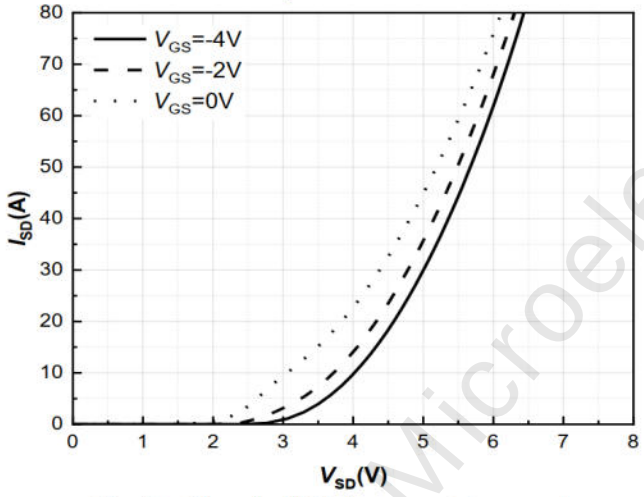


Fig 10: Body Diode Characteristic Tj=175℃

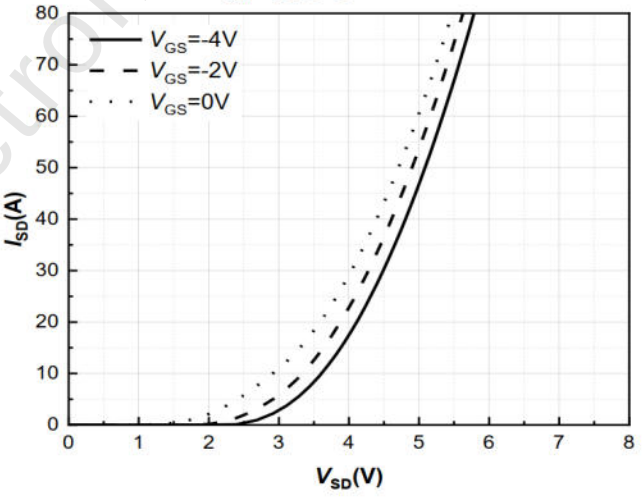


Fig 11: Threshold Voltage vs. Temperature

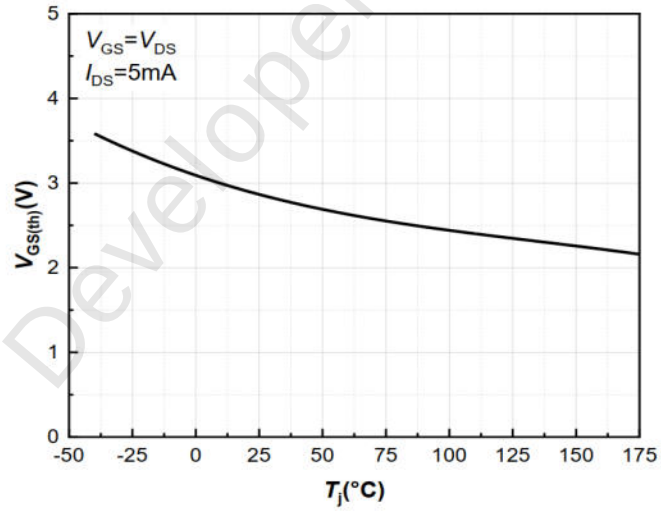


Fig 12: Capacitance Characteristics

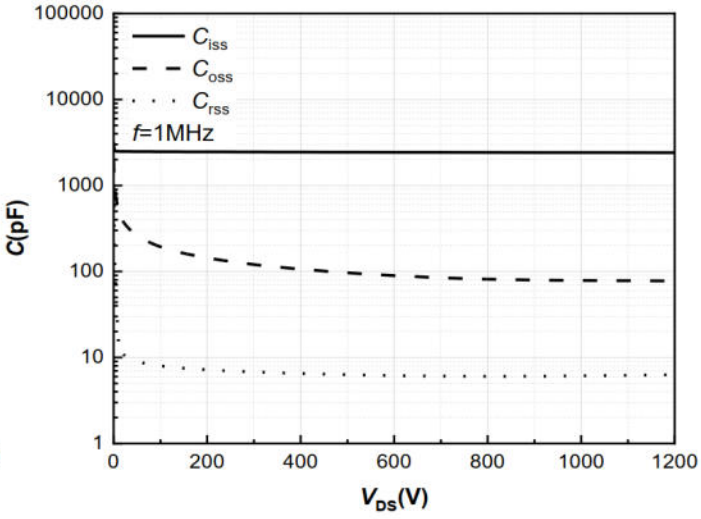


Fig 13: Gate Charge Characteristics

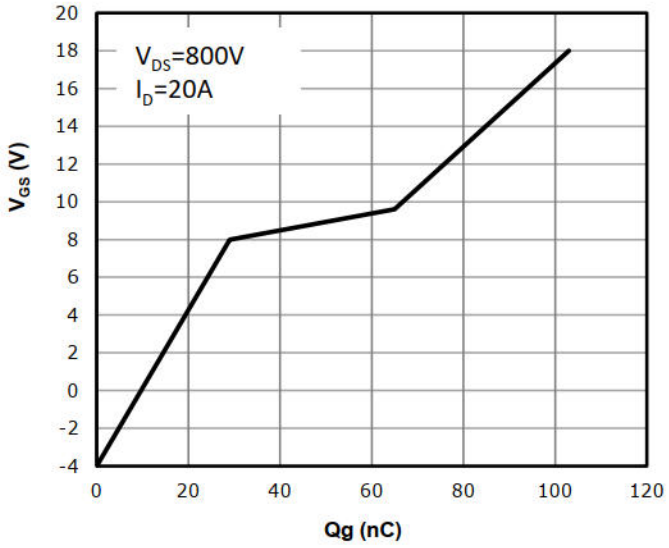


Fig 14: Clamped Inductive Switching energy vs Rg

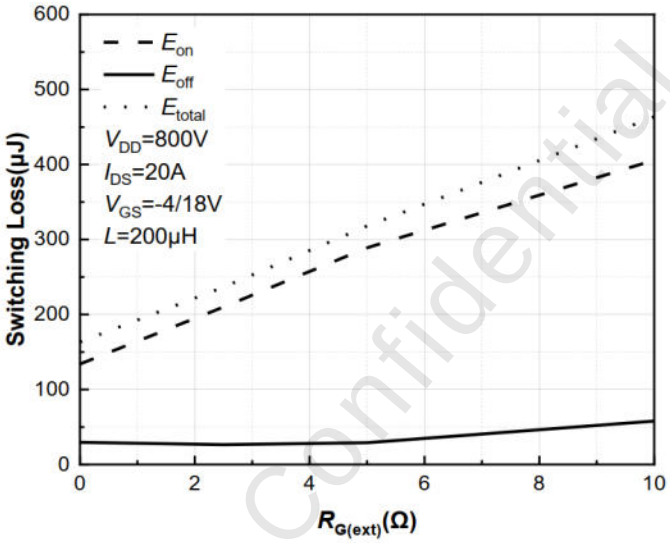


Fig 15: Power Dissipation

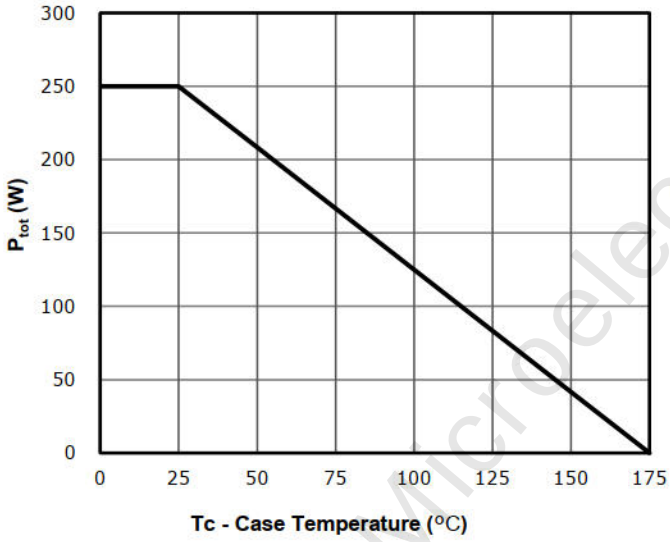


Fig 16: Drain Current Derating

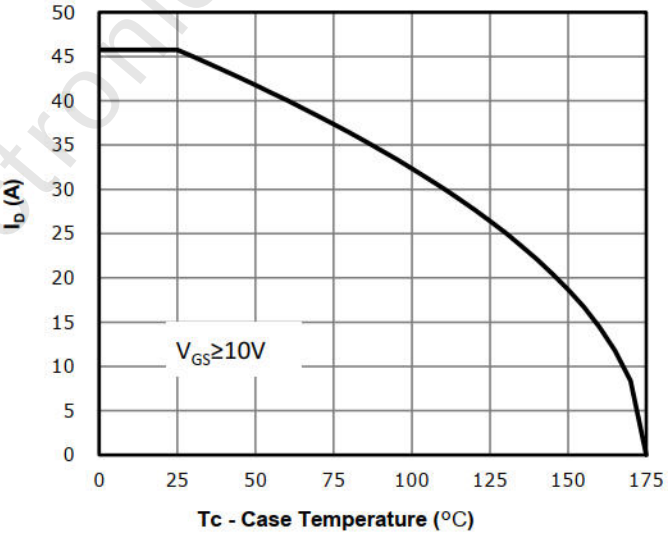


Fig 17: Safe Operating Area

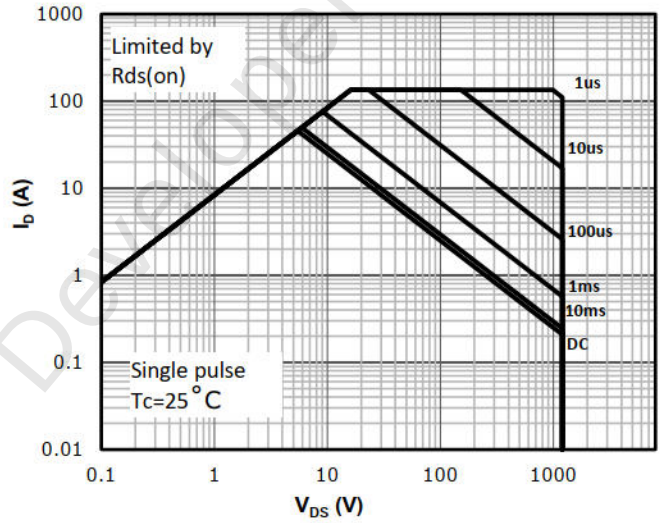
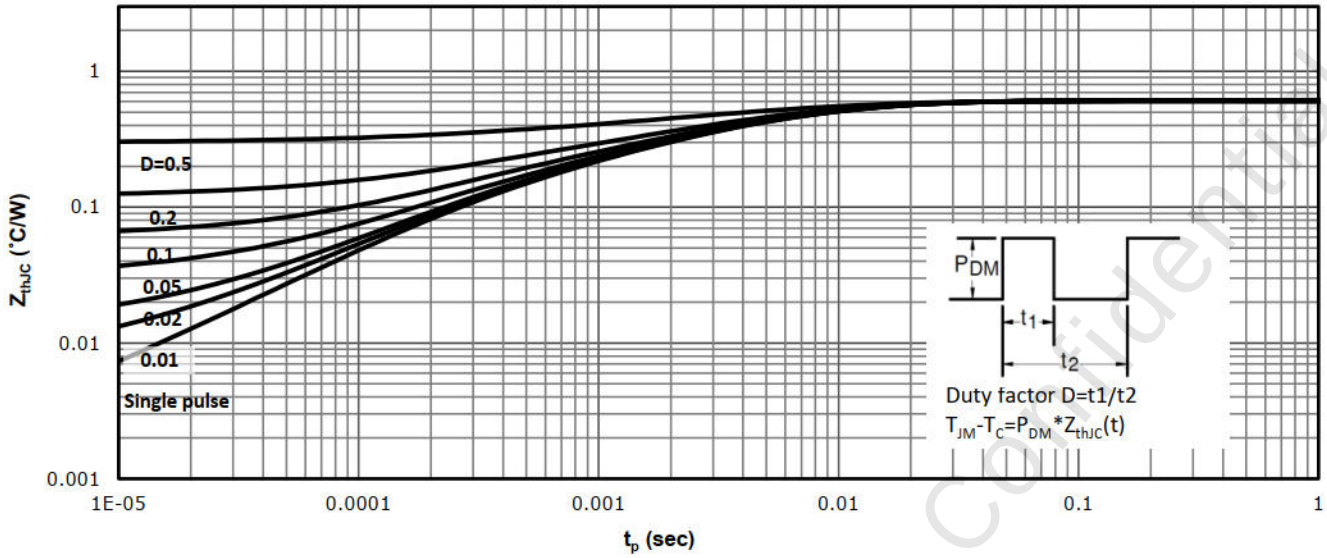
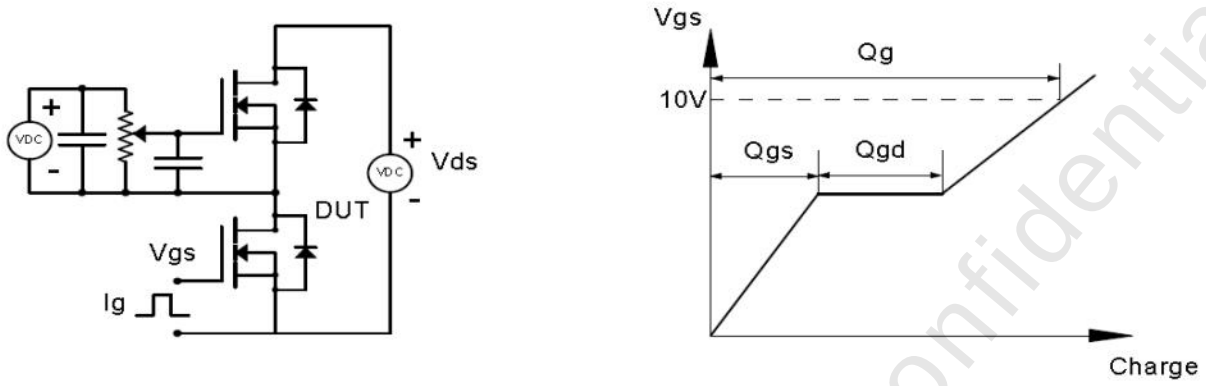


Fig 18: Max. Transient Thermal Impedance

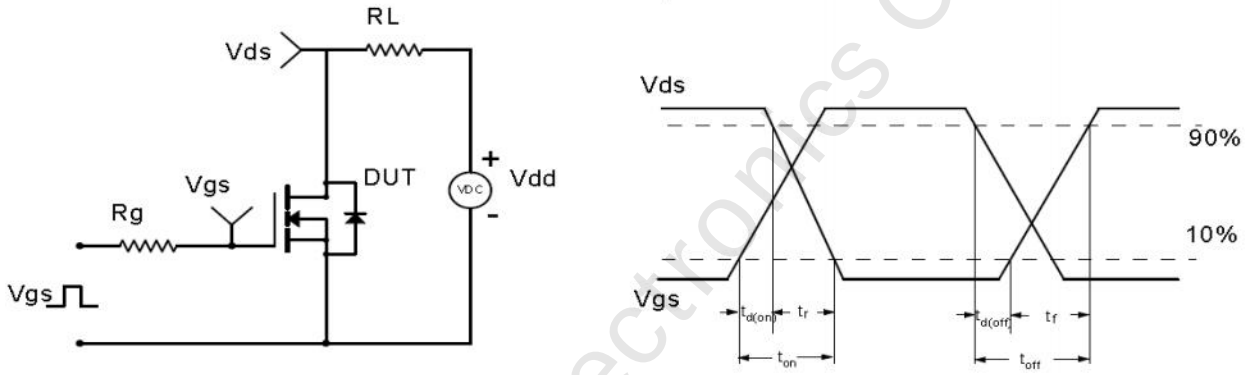


Test Circuit & Waveform

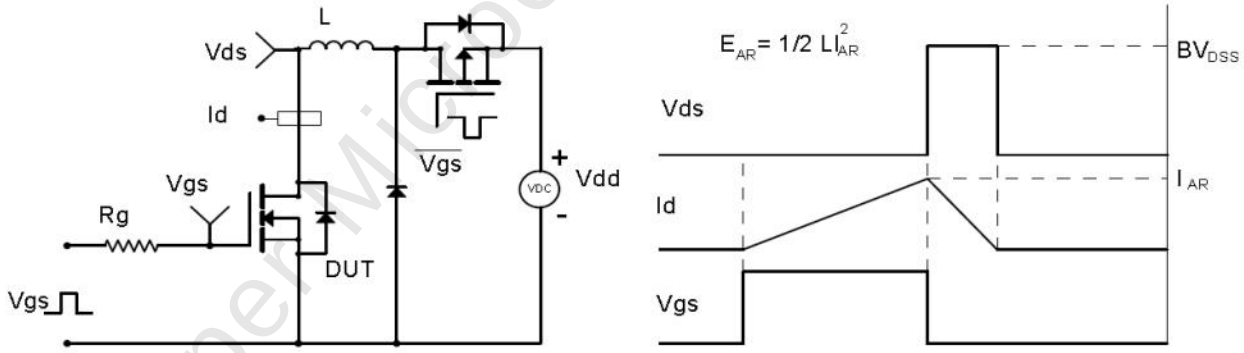
Gate Charge Test Circuit & Waveform



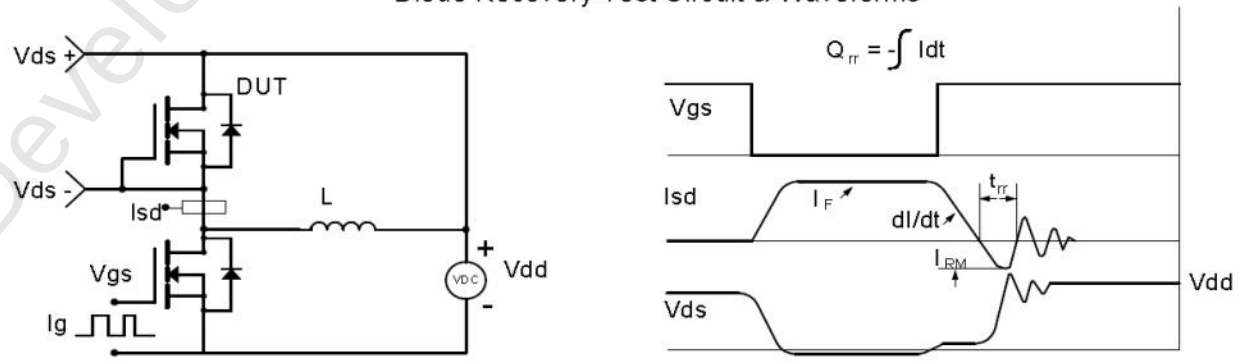
Resistive Switching Test Circuit & Waveforms



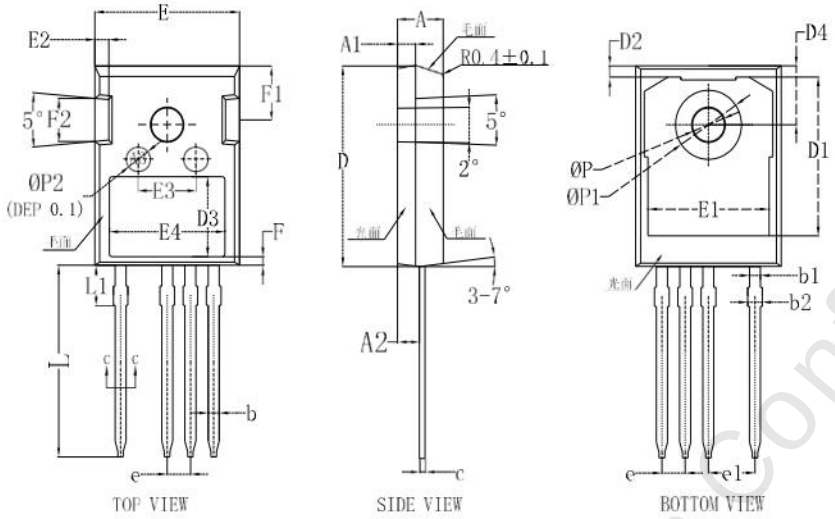
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

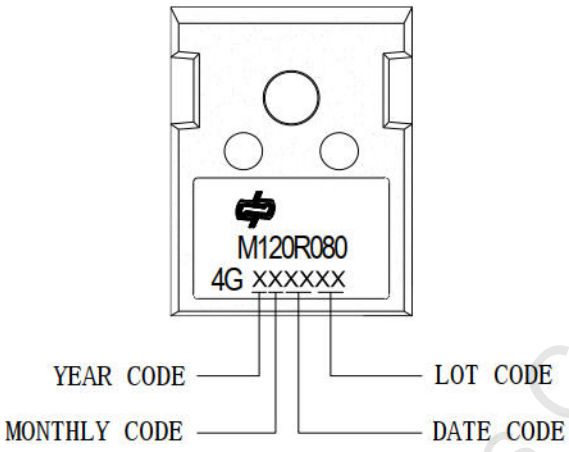


Package Outline: TO247-4L



Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	1.90	2.00	2.10
A2	2.31	2.41	2.51
b	1.15	1.20	1.25
b1	1.15	1.20	1.25
b2	1.20	1.30	1.40
b3	1.20	1.25	1.30
c	0.55	0.60	0.65
c1	0.60	0.62	0.64
D	20.90	21.00	21.10
D1	16.45	16.55	16.65
D2	1.07	1.17	1.27
D3	8.15	8.20	8.25
D4	6.05	6.15	6.25
E	15.70	15.70	15.90
E1	13.16	13.26	13.36
E2	2.40	2.50	2.60
E3	6.10	6.20	6.30
E4	12.70	12.80	12.90
F	0.75	0.85	0.90
F1	5.70	5.80	5.90
F2	4.90	5.00	5.10
e	2.54 BSC		
e1	5.08 BSC		
L	19.72	19.92	20.12
L1	4.03	4.13	4.23
ΦP	3.50	3.60	3.70
ΦP1	7.09	7.19	7.29
ΦP2	2.40	2.50	2.60

Part Marking Information



Revision History

Revison	Major changes
1.0	Release for formal version1.0

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