DPM080R160A3G1

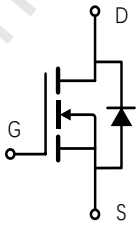
N-Channel Silicon Carbide MOSFET

Product Summary

Part #	V_{DS}	$R_{DS(on)}$	I_D (T_{vj}=25℃)
DPM080R160A3G1	800V	175mΩ	20A

TO-220F





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
DPM080R160A3G1	M080R160A3	TO-220F	Tube

Halogen-Free

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	800	V
Continuous drain current T_C = 25°C T_C = 100°C	I_D	 20 15	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	80	A
Gate-source voltage, max. transient voltage	V_{GSmax}	-8/+22	V
Gate-source voltage, max. static voltage	V_{GSop}	-4/+18	V
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C) Power dissipation (T_C = 100°C)	P_{tot}	28 11	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-40...+150	°C

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Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case. Max	R_{thMB}	4.5	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	65	

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}	800	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2	2.7 2.0	4	V	V_{DS}=V_{GS},I_D=2.5mA T_j=25°C T_j=175°C
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	V_{DS}=650V,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	$R_{DS(on)}$	-	175 188	220	mΩ	V_{GS}=18V, I_D=10A T_j=25°C T_j=175°C
Gate resistance	R_g	-	4	-	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz
Dynamic Characteristic[2]						
Input Capacitance	C_{iss}	-	310	-	pF	V_{GS}=0V, V_{DS}=600V, f=1MHz
Output Capacitance	C_{oss}	-	32	-		
Reverse Transfer Capacitance	C_{rss}	-	4.4	-		
Gate Total Charge	Q_g	-	16	-	nC	V_{GS}=-4/18V, V_{DS}=400V, I_D=10A, f=1MHz
Gate-Source charge	Q_{gs}	-	3	-		
Gate-Drain charge	Q_{gd}	-	4.2	-		
Turn-on delay time	$t_{d(on)}$	-	5	-	ns	V_{GS}=-4/18V, V_{DD}=400V, R_{G_ext}=2.5Ω L=200μH
Rise time	t_r	-	14	-		
Turn-off delay time	$t_{d(off)}$	-	9	-		
Fall time	t_f	-	5	-		
Turn-On Energy	E_{on}	-	46	-	μJ	
Turn-Off Energy	E_{off}	-	8	-		

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Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	4.2 3.9	5.5	V	V_{GS}=-4V,I_{SD}=5A T_j=25°C T_j=175°C
Diode continuous forward current	I_s		17 15	- -	A	V_{GS}=-4V T_C = 25°C T_C = 100°C
Diode Peak reverse recovery Current	I_{rrm}	-	6.5	-	A	VGS=-4V,V_R=400V I_{SD}=5A, dI/dt=1000A/μs
Body Diode Reverse Recovery Time[2]	t_{rr}	-	9	-	ns	
Body Diode Reverse Recovery Charge[2]	Q_{rr}	-	33	-	nC	

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

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Typical Performance Characteristics

Fig 1: Output Characteristics
Tj=-40 ℃

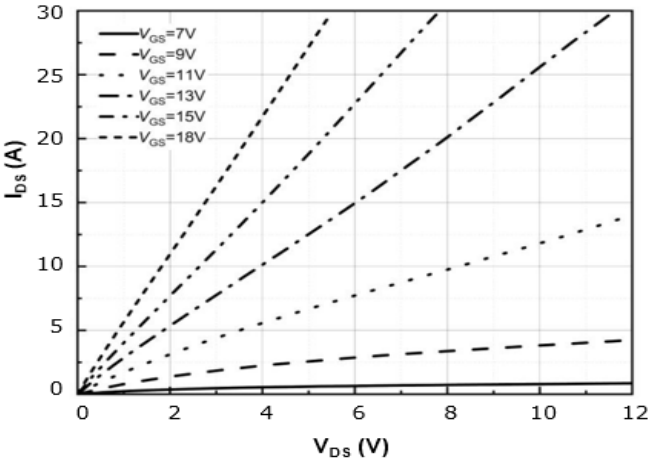


Fig 2: Output Characteristics
Tj=25℃

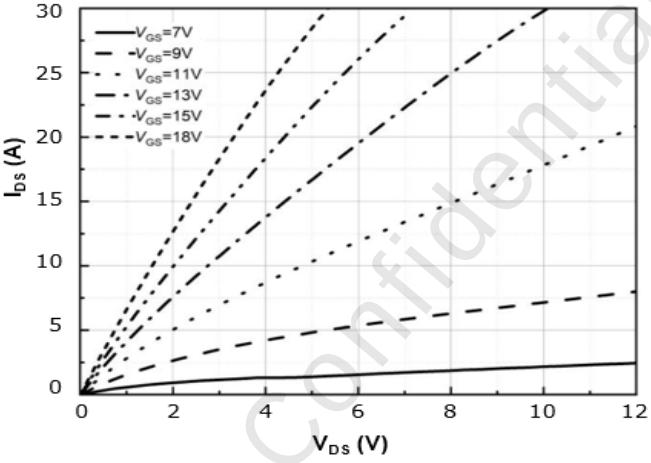


Fig 3: Output Characteristics
Tj=175℃

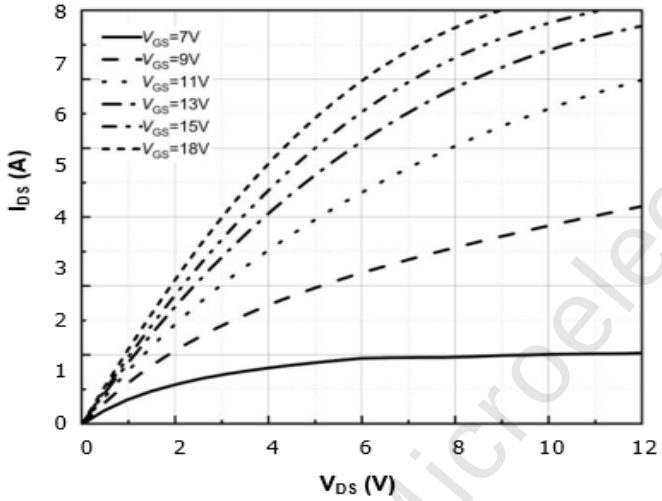


Fig 4: Rds(on) vs Drain Current
for various Temperature

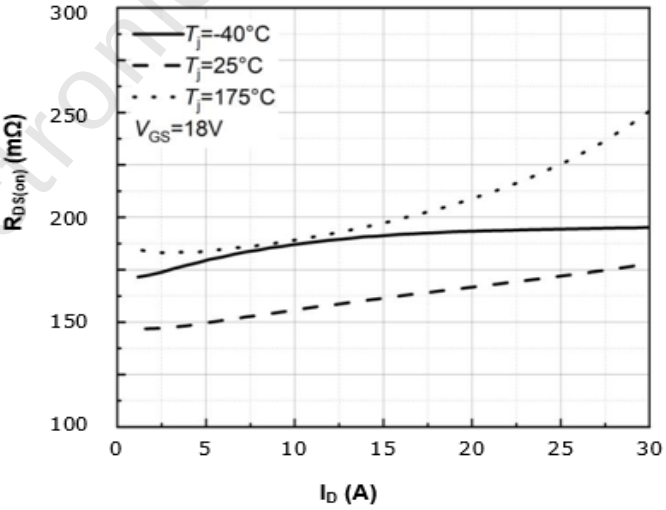


Fig 5: Rds(on) vs. Temperature

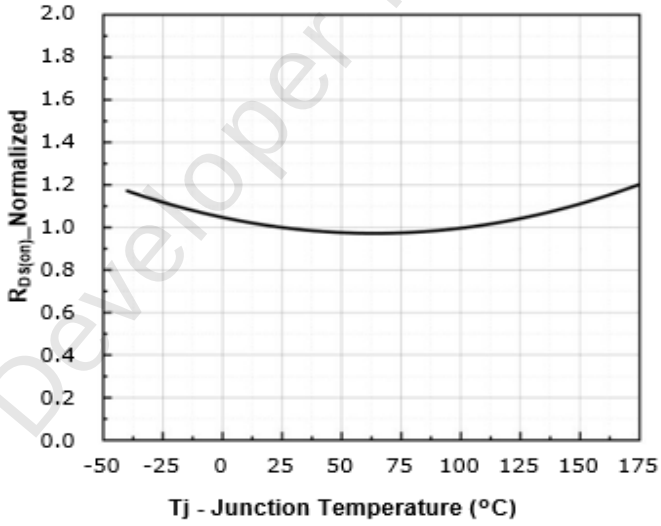
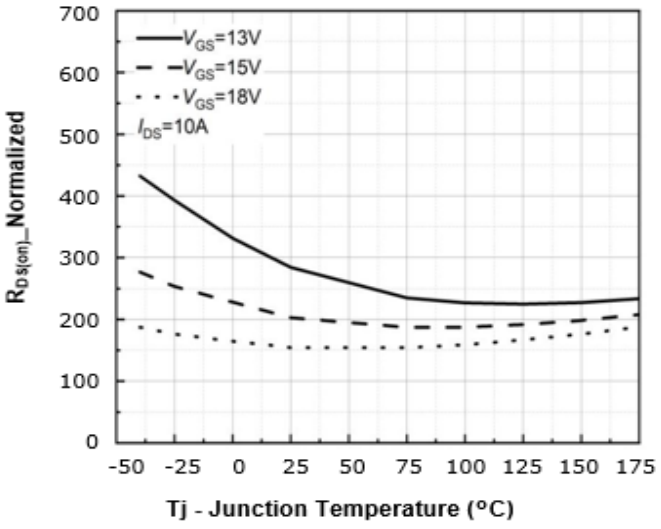


Fig 6: Rds(on) vs. Gate Voltage at



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Typical Performance Characteristics

Fig 7: Transfer Characteristics

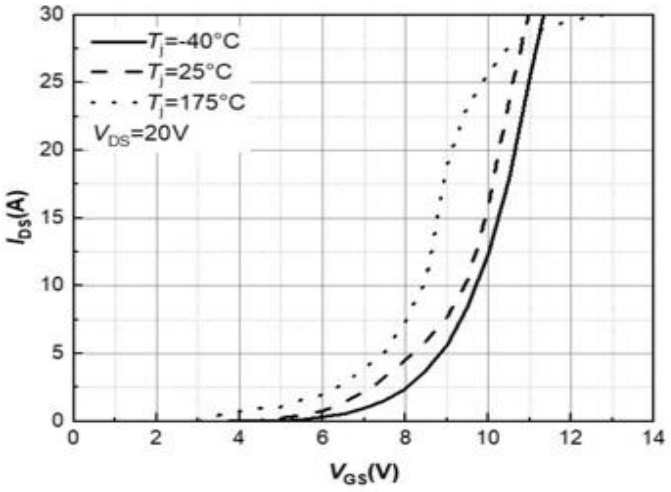


Fig 8: Body Diode Characteristic Tj=-40℃

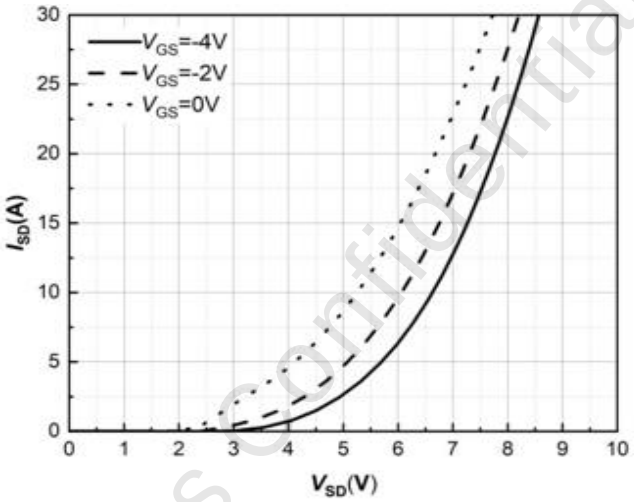


Fig 9: Body Diode Characteristic Tj=25℃

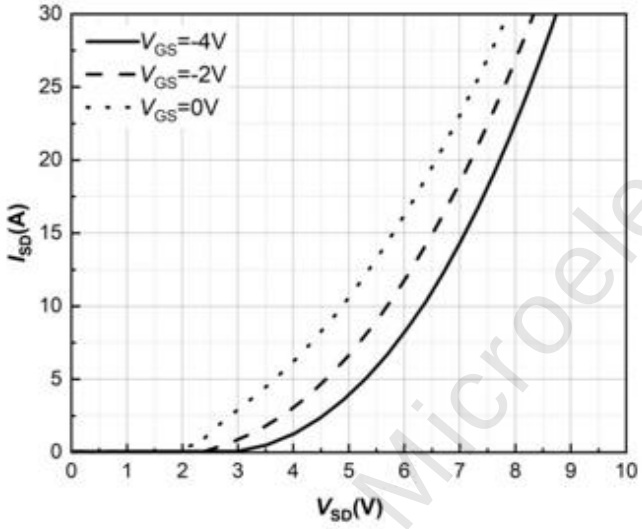


Fig 10: Body Diode Characteristic Tj=175℃

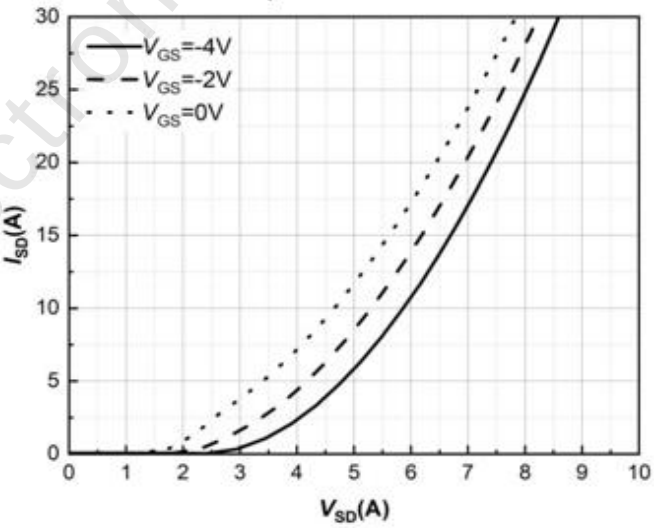


Fig 11: Threshold Voltage vs. Temperature

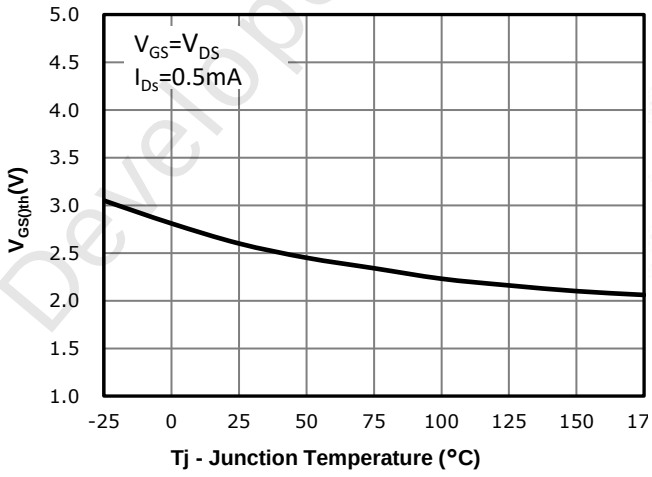
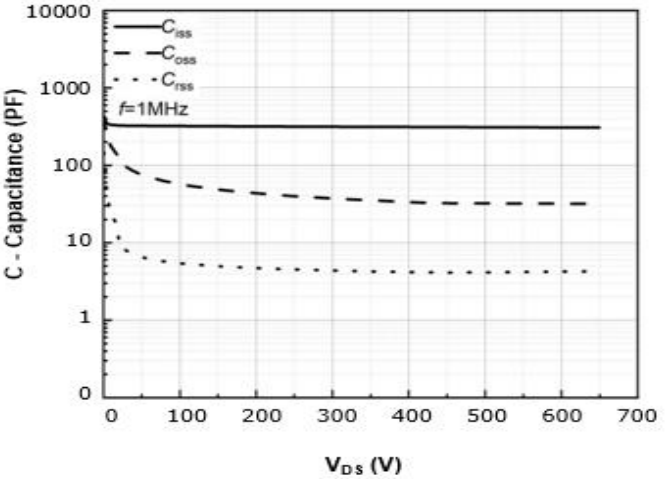


Fig 12: Capacitance Characteristics



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Fig 13: Gate Charge Characteristics

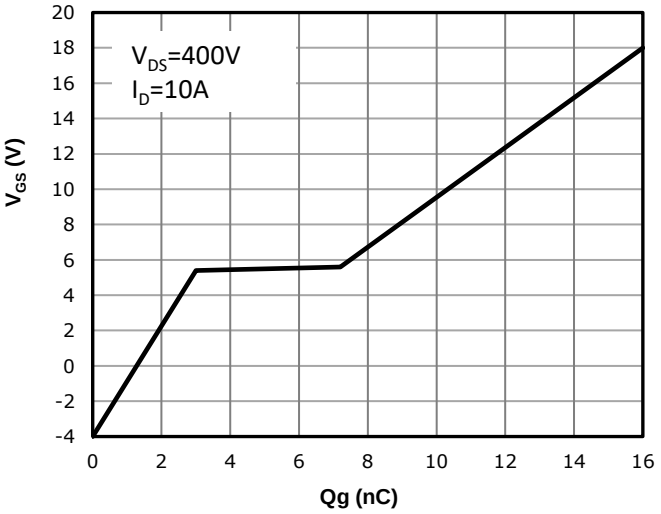


Fig 14: Clamped Inductive Switching energy vs Rg

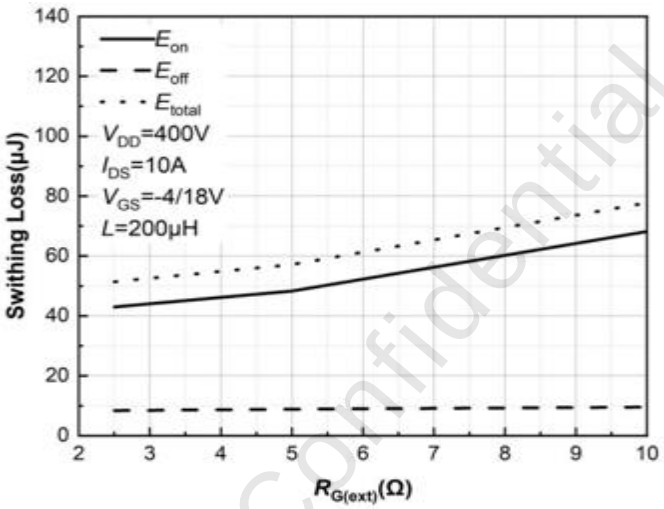


Fig 15: Power Dissipation

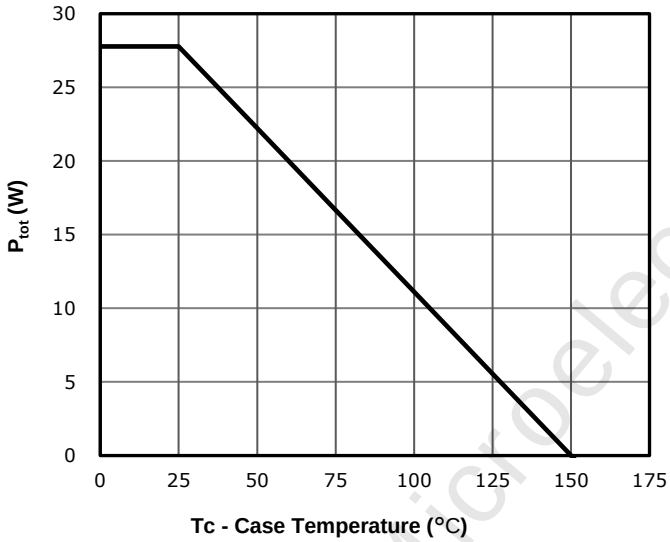


Fig 16: Drain Current Derating

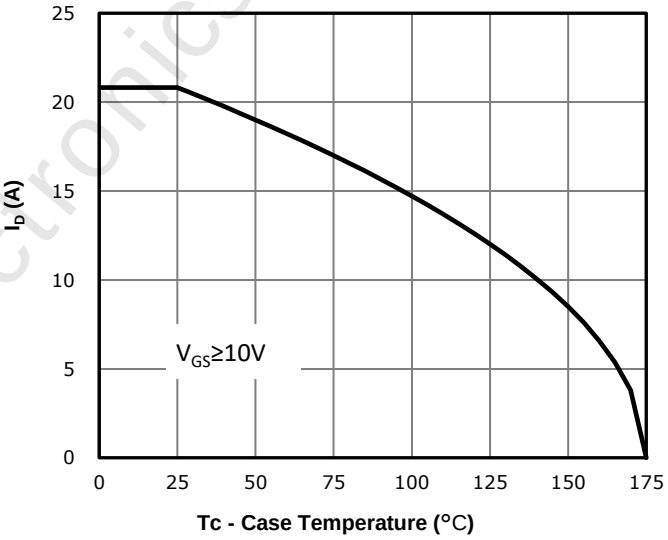
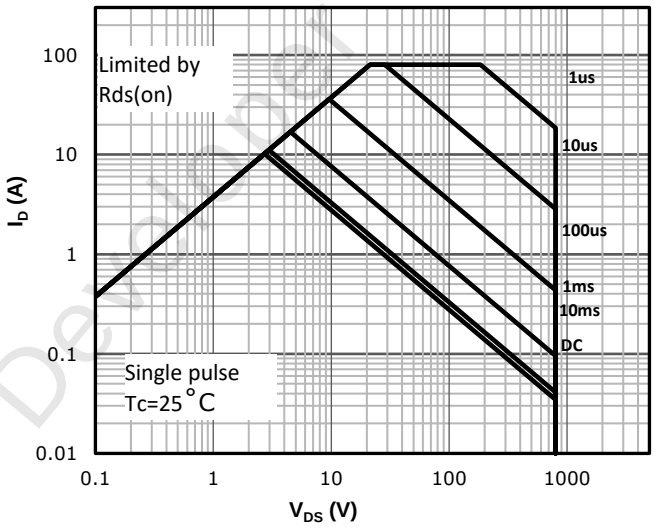
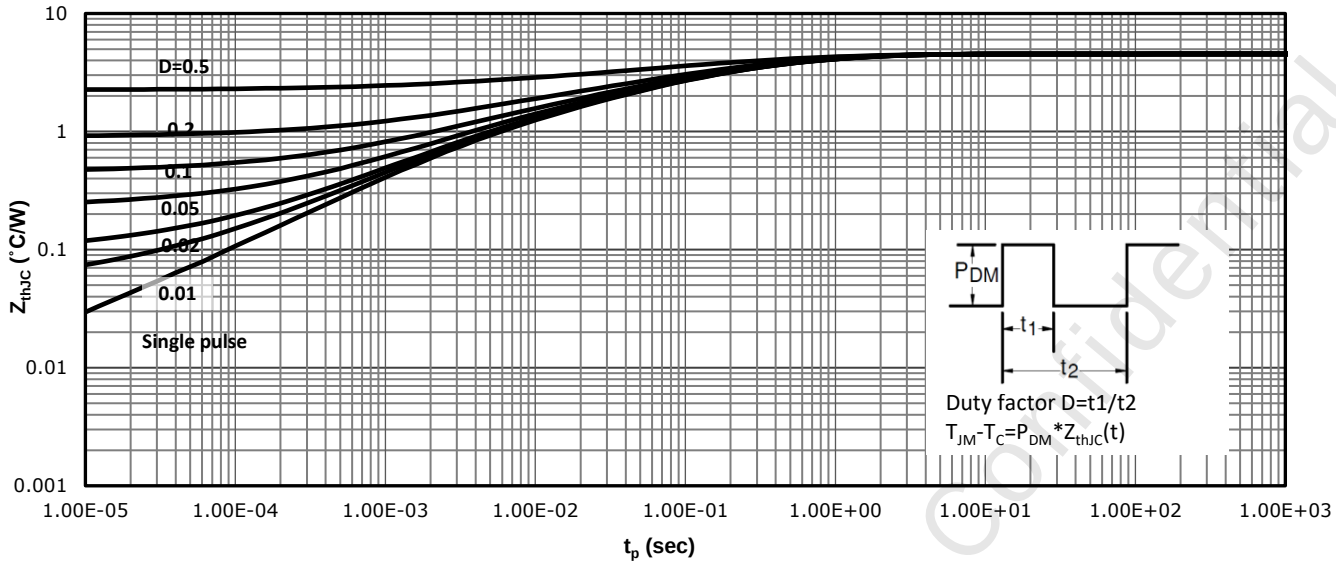


Fig 17: Safe Operating Area



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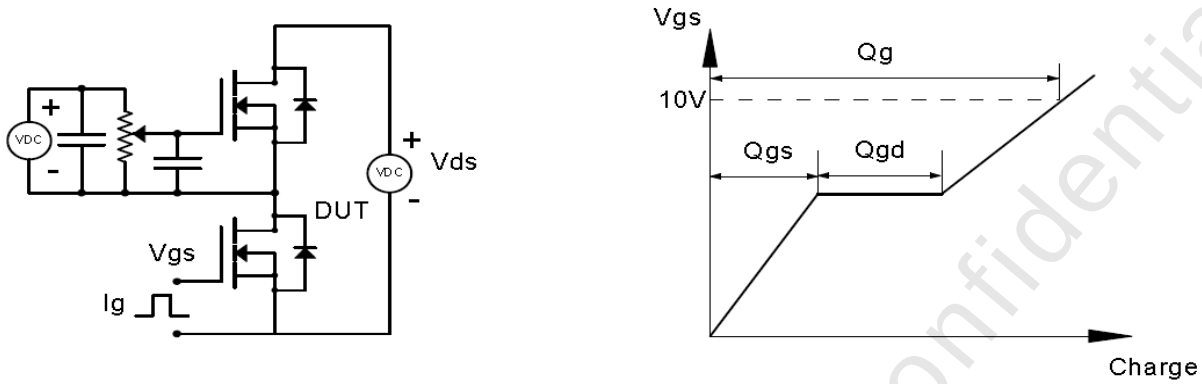
Fig 18: Max. Transient Thermal Impedance



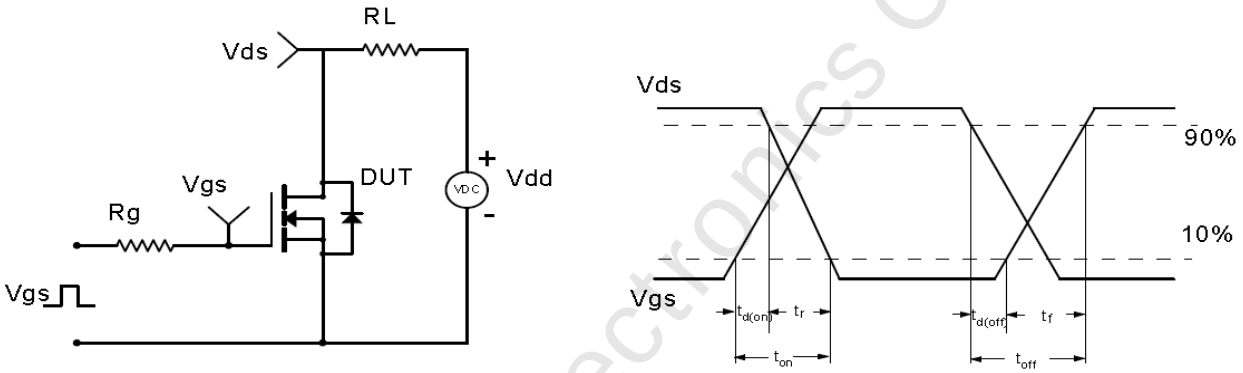
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Test Circuit & Waveform

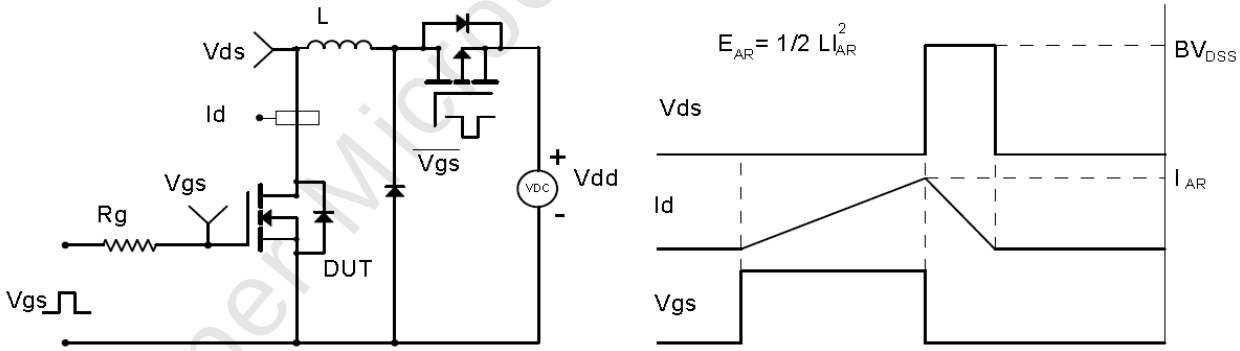
Gate Charge Test Circuit & Waveform



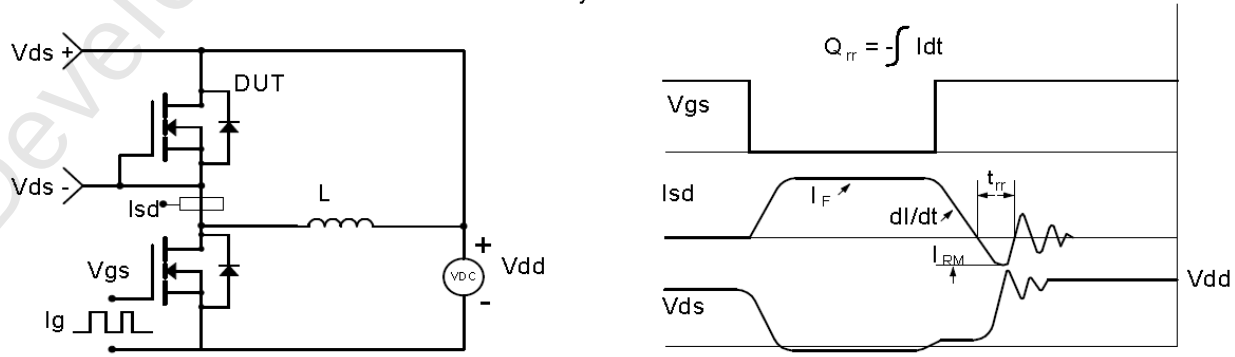
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

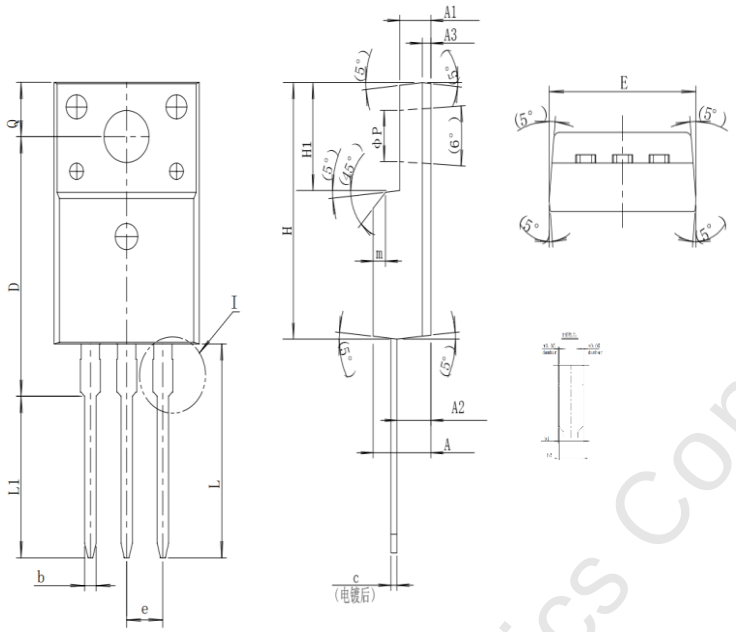


Diode Recovery Test Circuit & Waveforms



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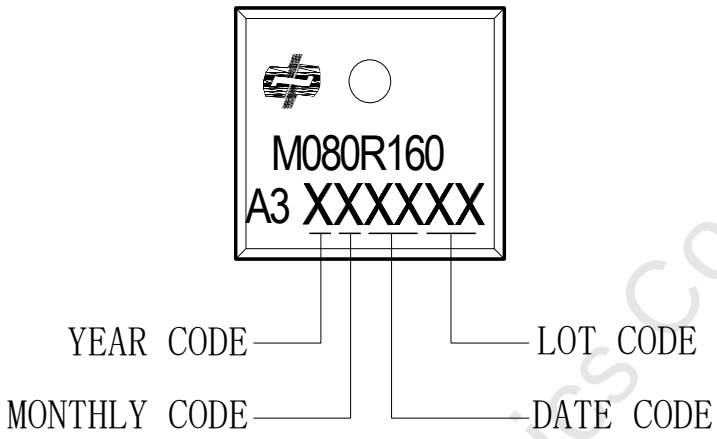
Package Outline: TO-220F



Symbol	Dimensions In Millimeters		
	Min.	NOM	Max.
A	4.60	4.70	4.80
A1	2.44	2.54	2.64
A2	2.65	2.75	2.85
A3		0.7 REF	
b	0.70	0.80	0.90
b1	1.28	1.38	1.47
b2	1.18	1.28	1.39
c	0.45	0.50	0.60
D	15.64	15.75	15.85
E	10.06	10.16	10.26
e		2.54 BSC	
H	15.77	15.87	15.97
H1	6.58	6.68	6.78
L	12.68	12.98	13.28
L1	9.60	9.80	10.00
Q	3.20	3.30	3.40
ΦP	3.08	3.18	3.28
m	0.50	1.00	1.50

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Part Marking Information



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Revision History

Revison	Major changes
1.00	Release for formal version

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