DPM080R500A3G1

N-Channel Silicon Carbide MOSFET

Product Summary

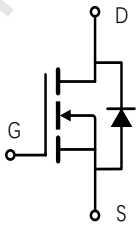
Part #	V_{DS}	$R_{DS(on)}$	I_D (T_{vj}=25℃)
DPM080R500A3G1	800V	490mΩ	6A

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
DPM080R500A3G1	M080R500A3	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	 6 4.5	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	24	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}	23 12	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-40...+175	°C

Developer Microelectronics Confidential

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – mounting base	R_{thMB}	6.5	°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	3 2.1	4	V	V_{DS}=V_{GS},I_D=1mA T_j=25°C T_j=175°C
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	V_{DS}=640V,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	$R_{DS(on)}$	-	490 610	635	mΩ	V_{GS}=18V, I_D=3.3A T_j=25°C T_j=175°C
		-	640 670	830	mΩ	V_{GS}=15V, I_D=3.3A T_j=25°C T_j=175°C
Gate resistance	R_g	-	35	-	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz
Dynamic Characteristic[2]						
Input Capacitance	C_{iss}	-	115	-	pF	V_{GS}=0V, V_{DS}=600V, f=1MHz
Output Capacitance	C_{oss}	-	18	-		
Reverse Transfer Capacitance	C_{rss}	-	2.8	-		
Gate Total Charge	Q_g	-	7.3	-	nC	V_{GS}=-4/18V, V_{DS}=400V, I_D=3.3A, f=1MHz
Gate-Source charge	Q_{gs}	-	1.2	-		
Gate-Drain charge	Q_{gd}	-	4.2	-		
Turn-on delay time	$t_{d(on)}$	-	4	-	ns	V_{GS}=-4/18V, V_{DD}=400V, R_{G_ext}=2.5Ω L=200μH
Rise time	t_r	-	14	-		
Turn-off delay time	$t_{d(off)}$	-	8	-		
Fall time	t_f	-	19	-		
Turn-On Energy	E_{on}	-	24	-	μJ	
Turn-Off Energy	E_{off}	-	4	-		

Developed per Microelectronics Confidential

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	4.8 4.3	6.3	V	V_{GS}=-4V,I_{SD}=1.7A T_j=25°C T_j=175°C
Diode continuous forward current	I_s		6 2.5	- -	A	V_{GS}=0V T_C = 25°C T_C = 100°C
Diode Peak reverse recovery Current	I_{rrm}	-	2	-	A	VGS=-4V,V_R=400V I_{SD}=1.7A, dI/dt=1990A/μs
Body Diode Reverse Recovery Time[2]	t_{rr}	-	45	-	ns	
Body Diode Reverse Recovery Charge[2]	Q_{rr}	-	54	-	μC	

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

Developer Microelectronics Confidential

Typical Performance Characteristics

Fig 1: Output Characteristics
Tj=-40 ℃

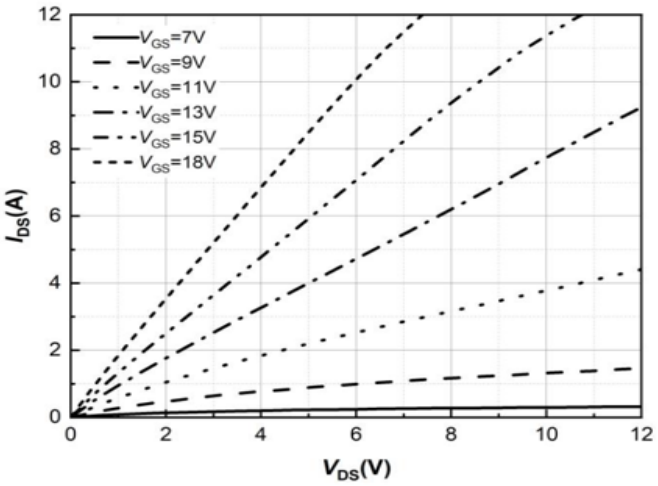


Fig 2: Output Characteristics
Tj=25℃

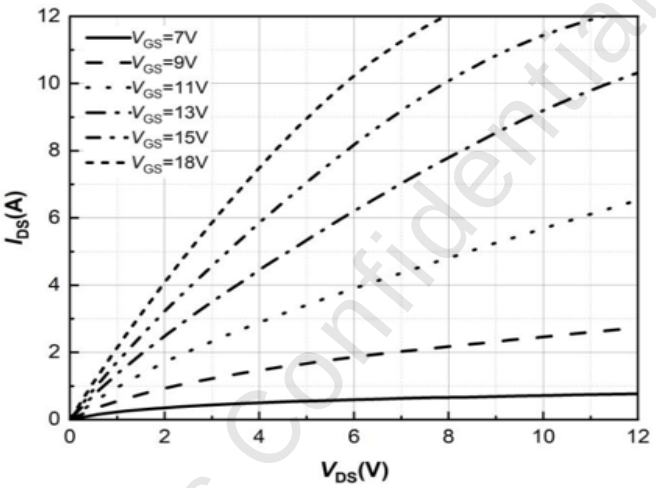


Fig 3: Output Characteristics
Tj=175℃

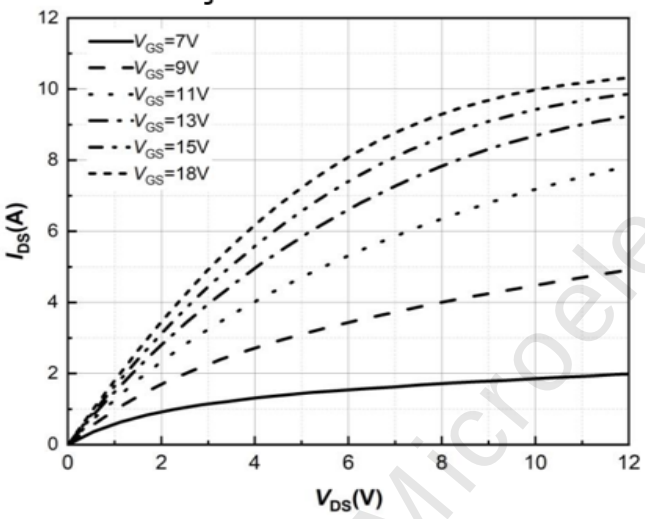


Fig 4: Rds(on) vs Drain Current for various Temperature

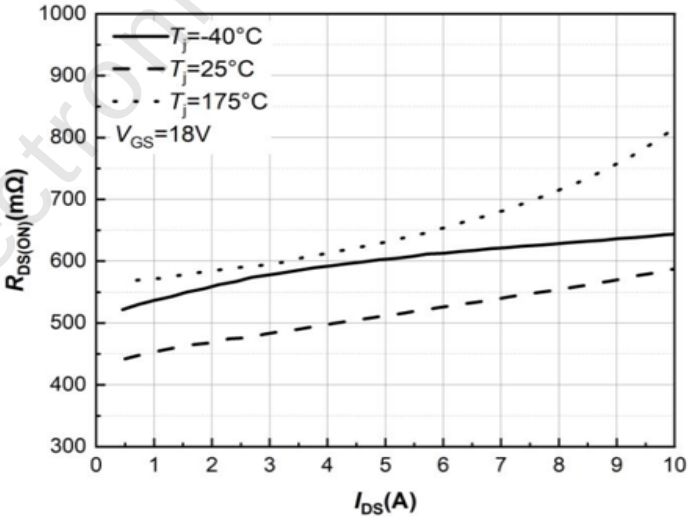


Fig 5: Rds(on) vs. Temperature

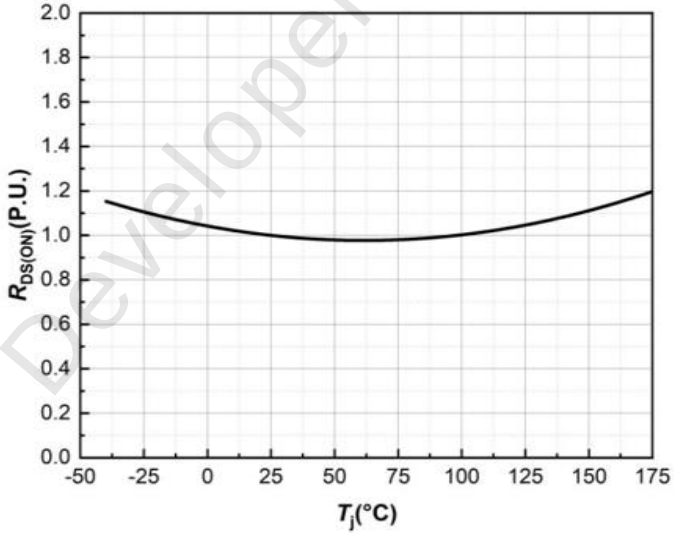
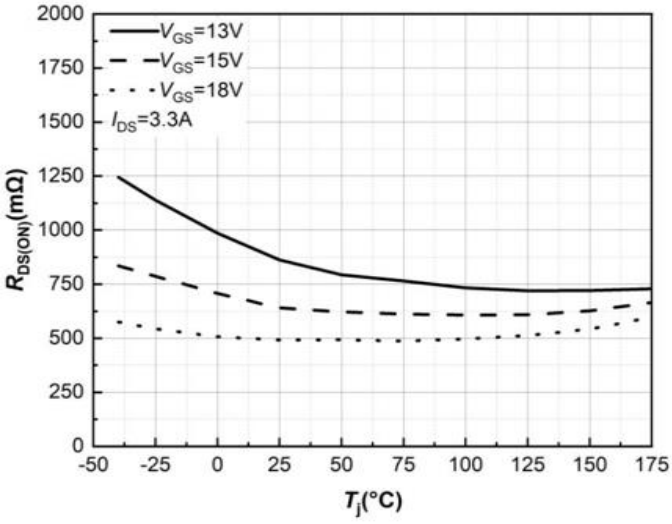


Fig 6: Rds(on) vs. Gate Voltage at Temperature



Developer Microelectronics Confidential

Typical Performance Characteristics

Fig 7: Transfer Characteristics

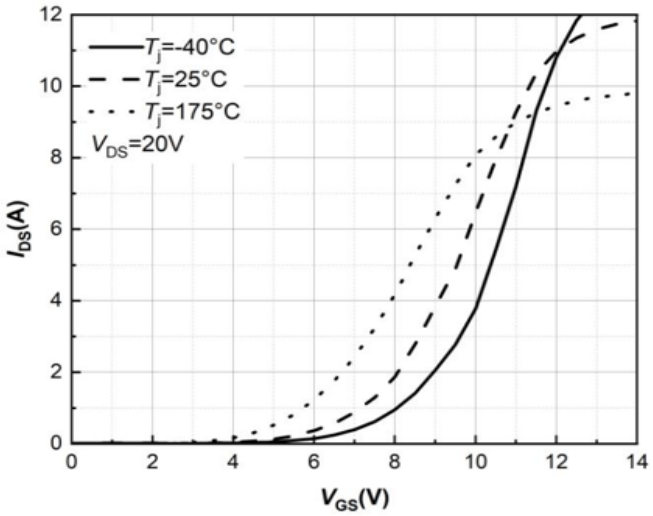


Fig 8: Body Diode Characteristic Tj=-40℃

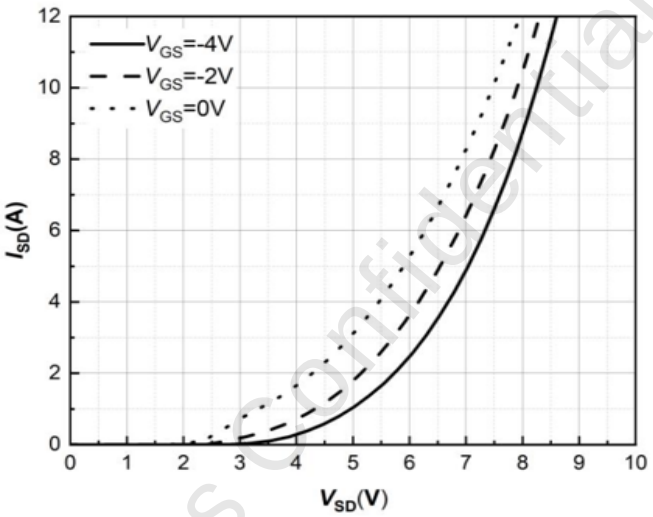


Fig 9: Body Diode Characteristic Tj=25℃

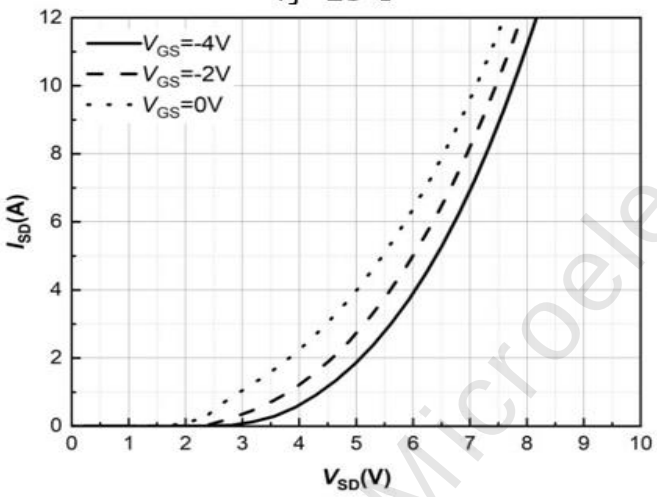


Fig 10: Body Diode Characteristic Ti=175℃

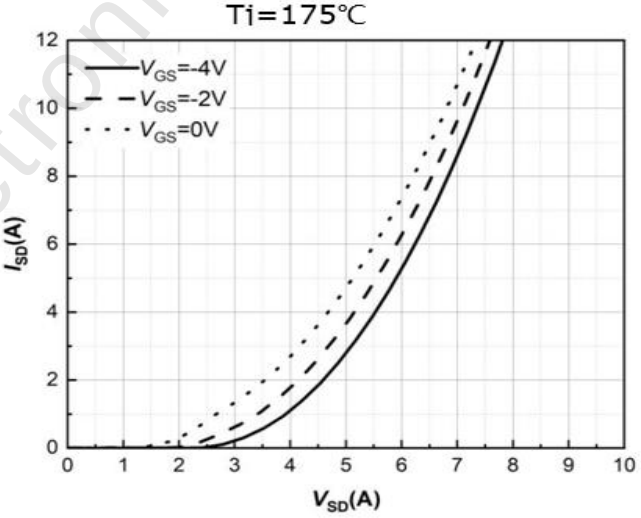


Fig 11: Threshold Voltage vs. Temperature

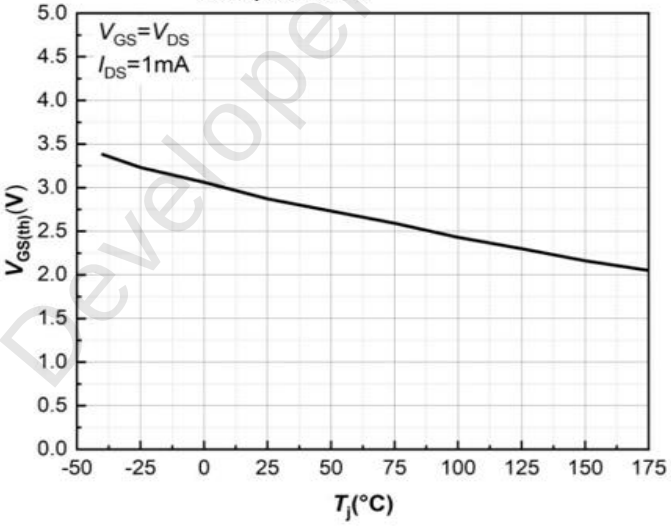
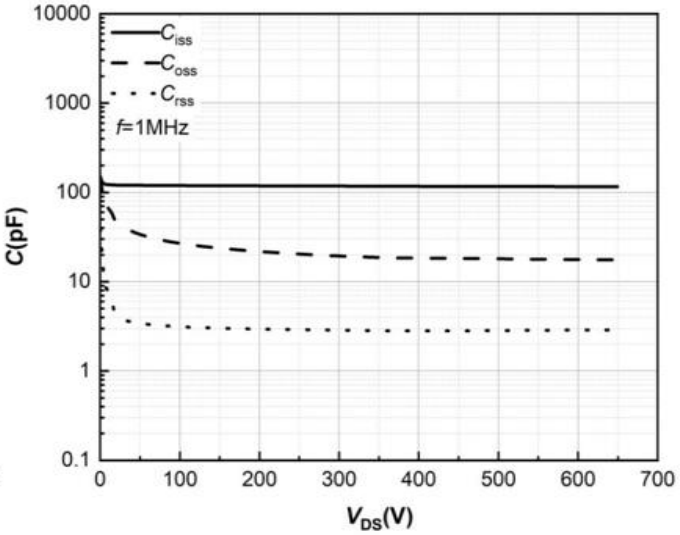


Fig 12: Capacitance Characteristics



Developer Microelectronics Confidential

Fig 13: Gate Charge Characteristics

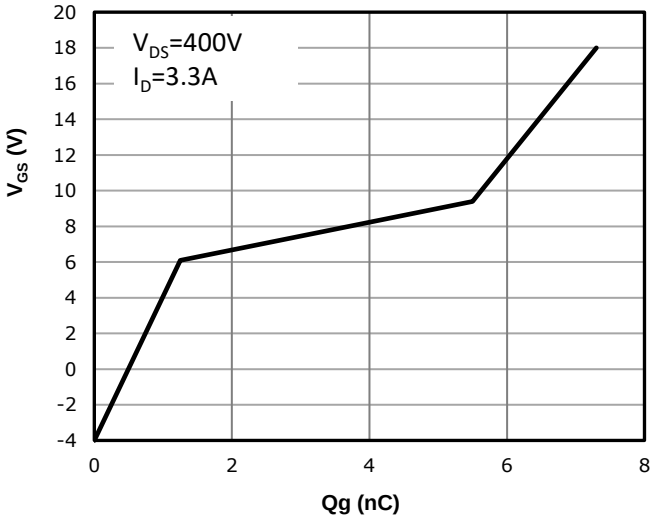


Fig 14: Clamped Inductive Switching energy vs Rg

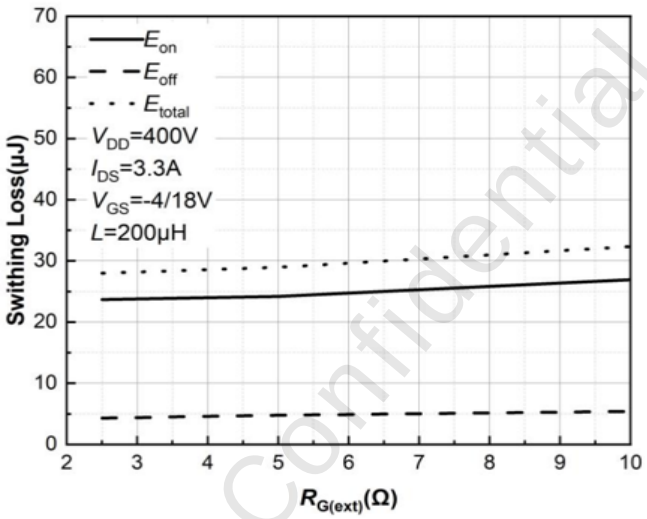


Fig 15: Power Dissipation

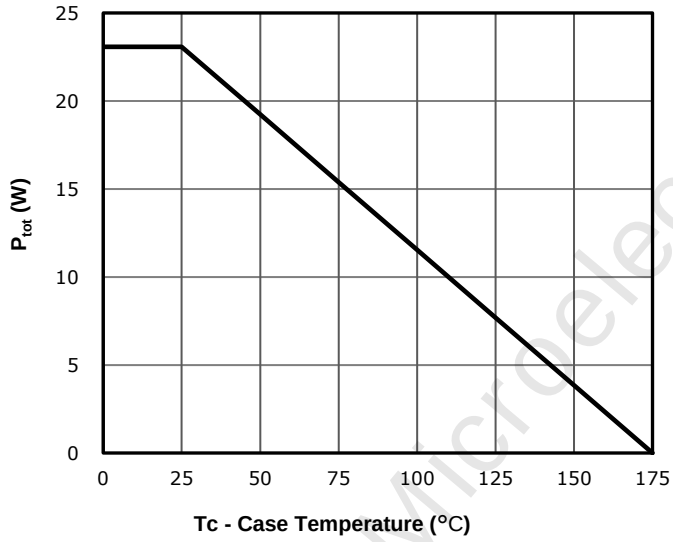


Fig 16: Drain Current Derating

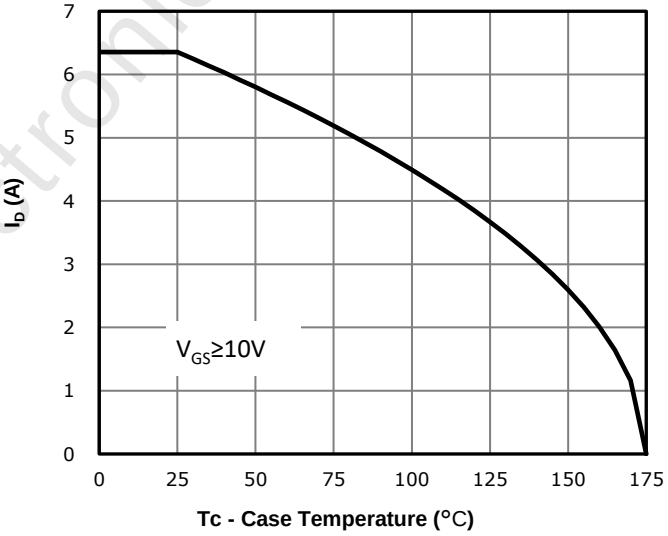
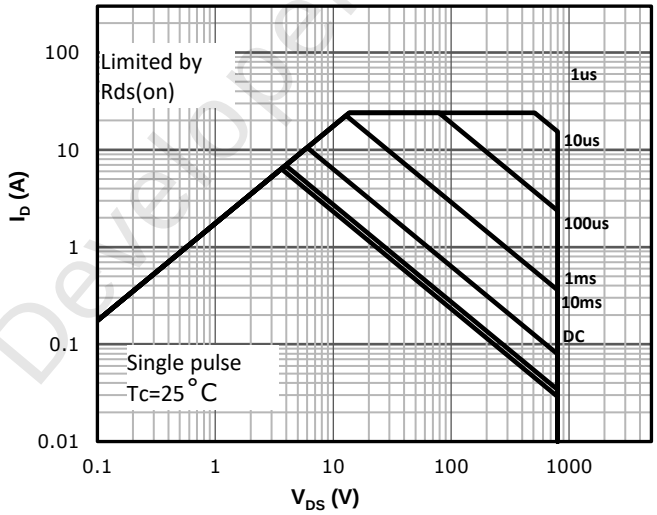
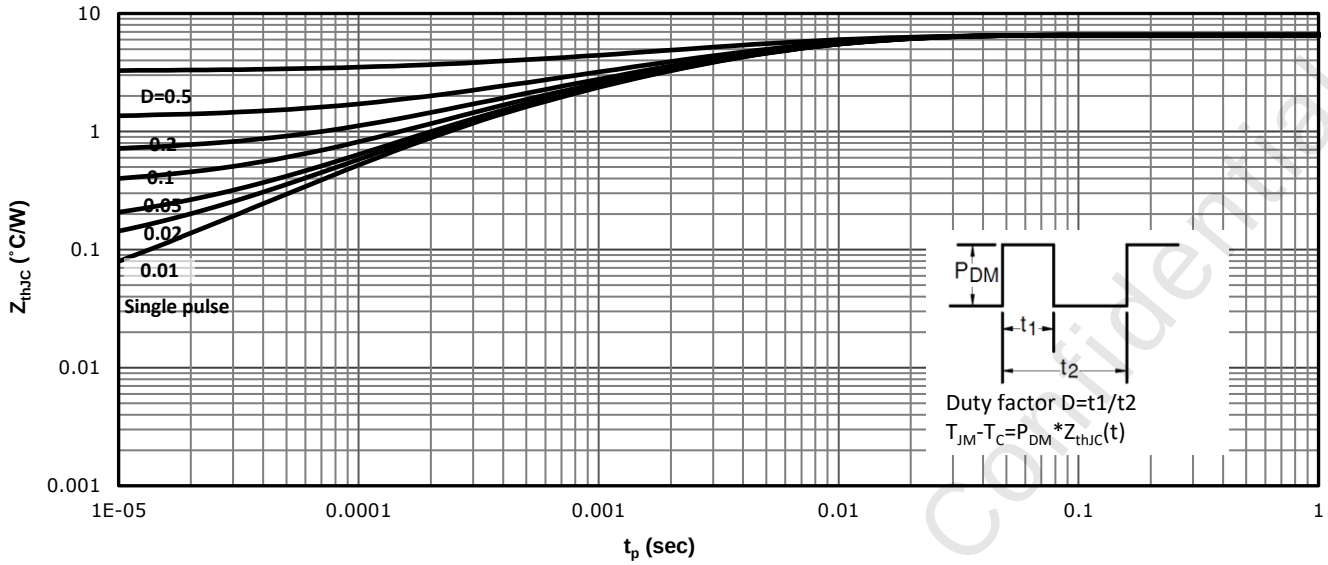


Fig 17: Safe Operating Area



Developer Microelectronics Confidential

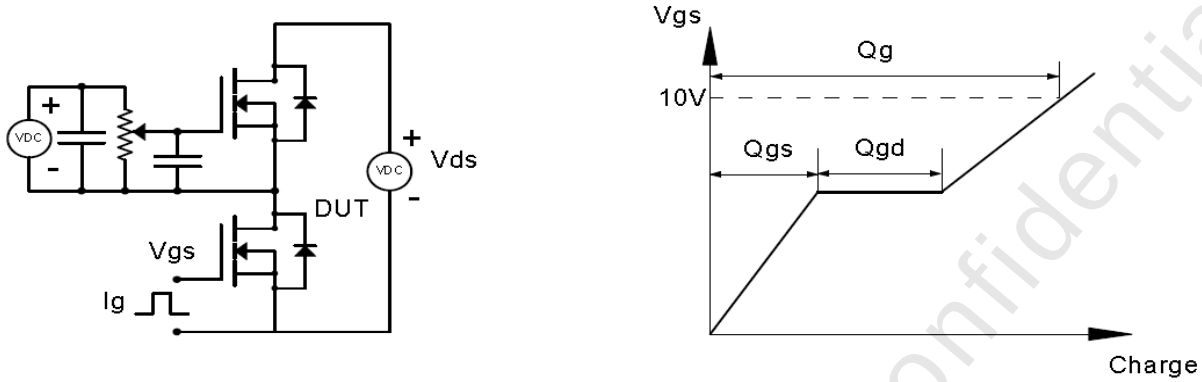
Fig 18: Max. Transient Thermal Impedance



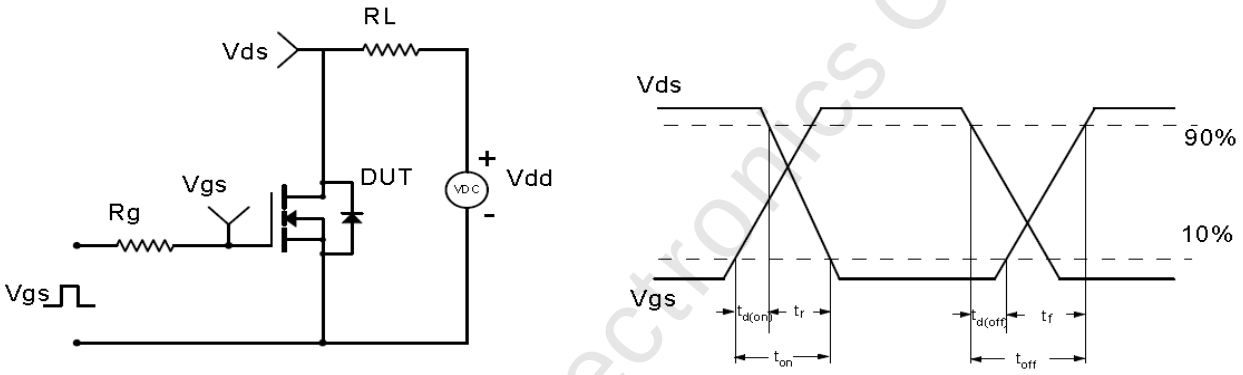
Developer Microelectronics Confidential

Test Circuit & Waveform

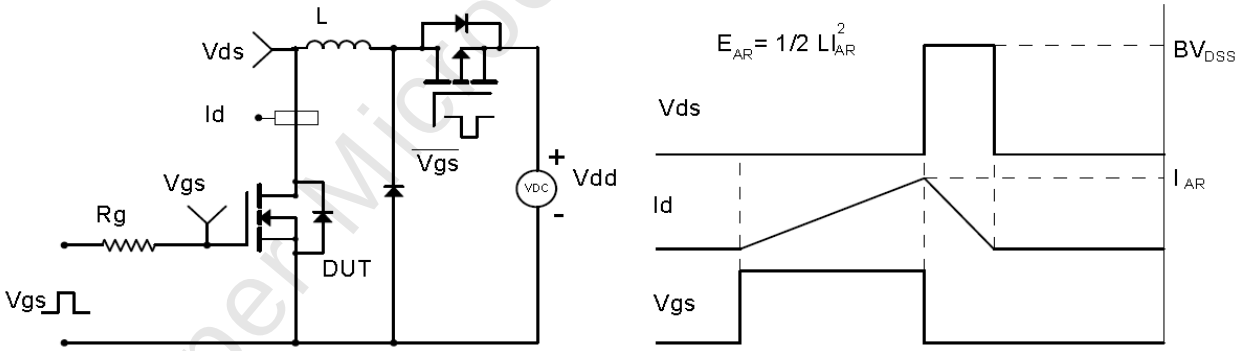
Gate Charge Test Circuit & Waveform



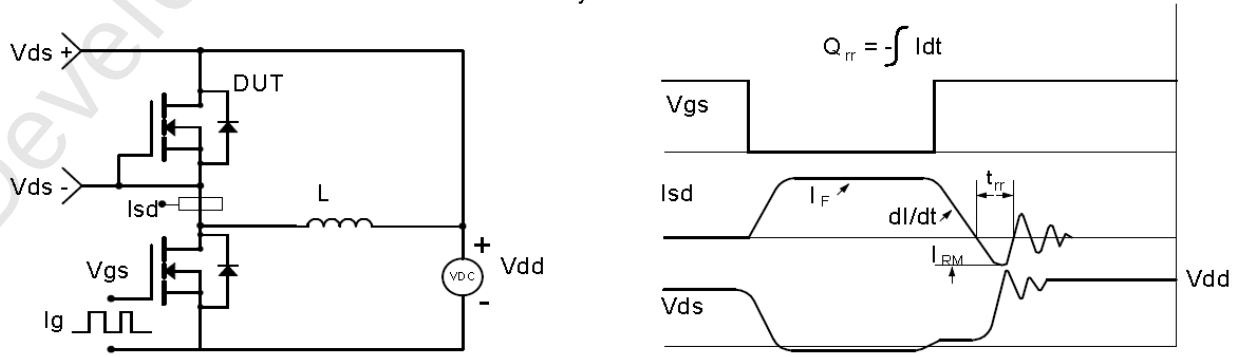
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

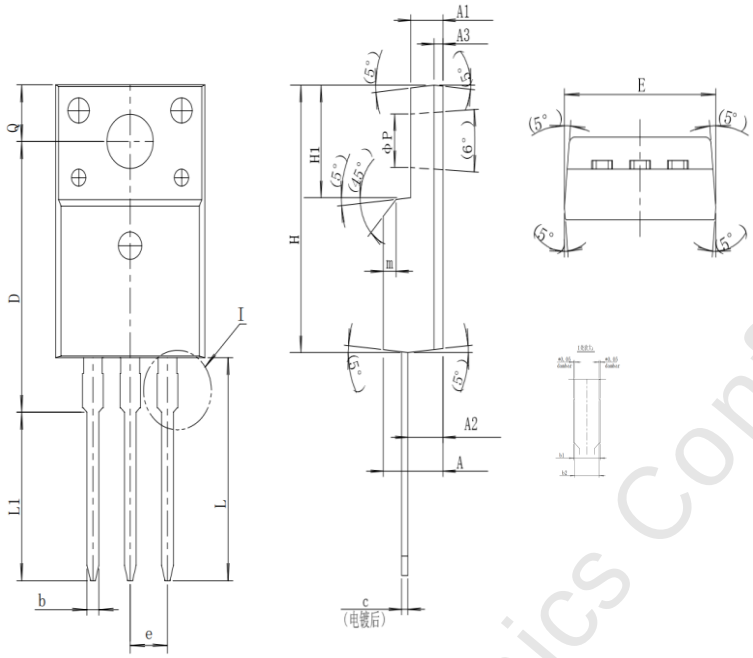


Diode Recovery Test Circuit & Waveforms



Developer Microelectronics Confidential

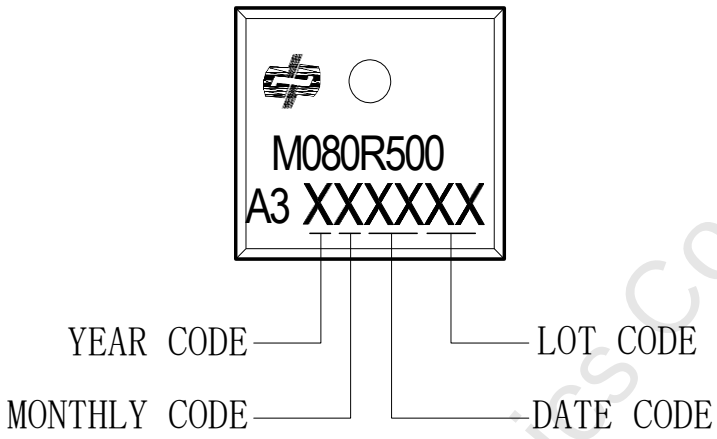
Package Outline: TO-220F



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

Developer Microelectronics Confidential

Part Marking Information



Developer Microelectronics Confidential

Revision History

Revison	Major changes
1.0	Release for formal version

Developer Microelectronics Confidential

重要声明Important Notice

德普微尽力确保本产品规格书内容的准确和可靠，但是保留在没有通知的情况下，修改规格书内容的权利。客户在下订单前应联系德普微获取最新的相关信息, 并验证这些信息是否完整且是最新的。所有产品的销售都遵循在订单确认时所提供的本公司销售条款与条件。

德普微会不定期更新本文档内容，产品实际参数可能因型号或者其他事项不同有所差异，本文档不作为任何明示或暗示的担保或授权。

本产品规格书未包含任何针对德普微或第三方所有的知识产权的授权。针对本产品规格书所记载的信息，德普微不做任何明示或暗示的保证，包括但不限于对规格书内容的准确性、商业上的适销性，特定目的的适用性或者不侵犯德普微或任何第三人知识产权做任何明示或暗示保证，德普微也不就因本规格书本身及其使用有关的偶然或必然损失承担任何责任。

德普微对应用帮助或客户产品设计不承担任何义务。客户应对其使用本公司的产品和应用自行负责。为尽量减小与客户产品和应用相关的风险，客户应提供充分的设计与操作安全验证。

针对本规格书所披露的内容，在未获得德普微的授权下，任何第三方不得使用、复制、转换，一经发现本公司必依法追究其法律责任，并赔偿由此对本公司造成的一切损失。

请注意在本资料记载的条件范围内使用产品，特别请注意绝对最大额定值、工作电压范围和电气特性等。 因在本资料记载的条件范围外使用产品而造成的故障和 (或) 事故等的损害，本公司对此概不承担任何责任。

本公司一直致力于提高产品的质量和可靠度，但所有的半导体产品都有一定的失效概率，这些失效概率可能会导致一些人身事故、火灾事故等。当设计产品时，请充分留意冗余设计并采用安全指标， 这样可以避免事故的发生。

使用本公司的IC生产产品时，如因其产品中对该IC的使用方法或产品的规格，或因进口国等原因，包含本IC产品在内的制品发生专利纠纷时，本公司概不承担相应责任。