

Product Summary

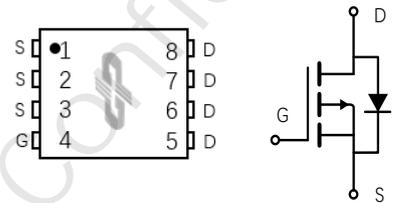
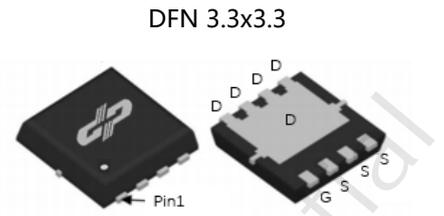
Part #	V_{DS}	$R_{DS(on),typ}$ (@ $V_{GS}=-10V$)	$R_{DS(on),typ}$ (@ $V_{GS}=-4.5V$)	I_D
DP400P04MTL	-40V	32mΩ	39mΩ	-15A

Features

- Uses advanced MOSFET-DPMOS technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

Applications

- Motor control and drive
- Battery management
- UPS (Uninterruptible Power Supplies)



100% Avalanche Tested

100% Rg Tested

Package Marking and Ordering Information

Part #	Marking	Package	Packing
DP400P04MTL	400P04MTL	DFN 3.3x3.3	Tape&Reel


Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	-40	V
Continuous drain current	I_D	-15	A
$T_C = 25^\circ C$		-10	A
$T_C = 100^\circ C$			
Pulsed drain current ($T_C = 25^\circ C$, t_p limited by T_{jmax})	$I_{D\ pulse}$	-60	A
Avalanche energy, single pulse ($L=0.1mH$, $R_g=25\Omega$) ^[1]	E_{AS}	18	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation ($T_C = 25^\circ C$)	P_{tot}	25	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	$^\circ C$

 [1].EAS is tested at starting $T_j = 25^\circ C$, $V_{GS} = 10V$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	5	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	60	

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

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

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	-40	-	-	V	$V_{GS}=0V, I_D=-250\mu A$
Gate threshold voltage	$V_{GS(th)}$	-1.2	-1.7	-2.3	V	$V_{DS}=V_{GS}, I_D=-250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	-1 -100	μA	$V_{DS}=-40V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=85^\circ C$
Gate-source leakage current	I_{GSS}	-	± 10	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	32 39	41 55	mΩ	$V_{GS}=-10V, I_D=-5A$ $V_{GS}=-4.5V, I_D=-3A$
Gate resistance	R_g	-	10	-	Ω	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$
Transconductance ^[2]	g_{fs}	-	50	-	S	$V_{DS}=-5V, I_D=-5A$

Dynamic Characteristic^[2]

Input Capacitance	C_{iss}	-	1102	-	pF	$V_{GS}=0V, V_{DS}=-20V,$ $f=1MHz$
Output Capacitance	C_{oss}	-	97	-		
Reverse Transfer Capacitance	C_{rss}	-	58	-		
Gate Total Charge (-10V)	Q_g	-	21	-	nC	$V_{GS}=-10V, V_{DS}=-20V,$ $I_D=-5A, f=1MHz$
Gate Total Charge (-4.5V)	Q_g	-	9	-		
Gate-Source charge	Q_{gs}	-	3.3	-		
Gate-Drain charge	Q_{gd}	-	3	-		
Turn-on delay time	$t_{d(on)}$	-	17	-	ns	$V_{GS}=-10V, V_{DD}=-20V,$ $R_{G_ext}=2.7\Omega$
Rise time	t_r	-	25	-		
Turn-off delay time	$t_{d(off)}$	-	32	-		
Fall time	t_f	-	30	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.8	1.2	V	$V_{GS}=0V, I_{SD}=-5A$
Diode continuous forward current	I_S	-	-	-15	A	TC = 25°C
Diode pluse current	$I_{S\ pluse}$	-	-	-60	A	TC = 25°C
Body Diode Reverse Recovery Time ^[2]	t_{rr}	-	14	-	ns	$I_F=-5A, dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge ^[2]	Q_{rr}	-	8	-	nC	

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

Typical Performance Characteristics

Fig 1: Output Characteristics

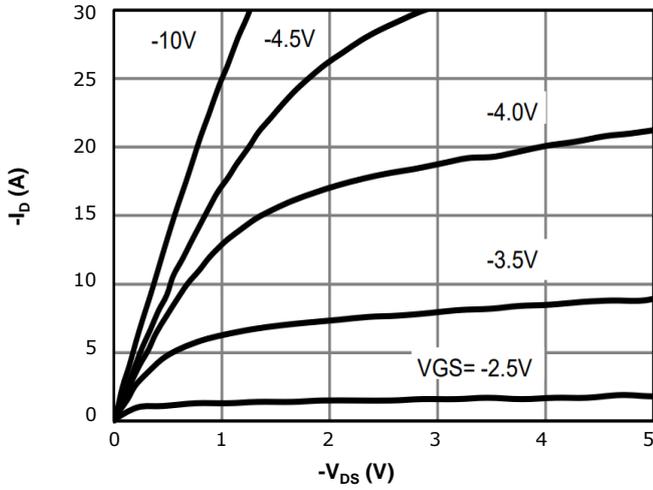


Fig 2: Transfer Characteristics

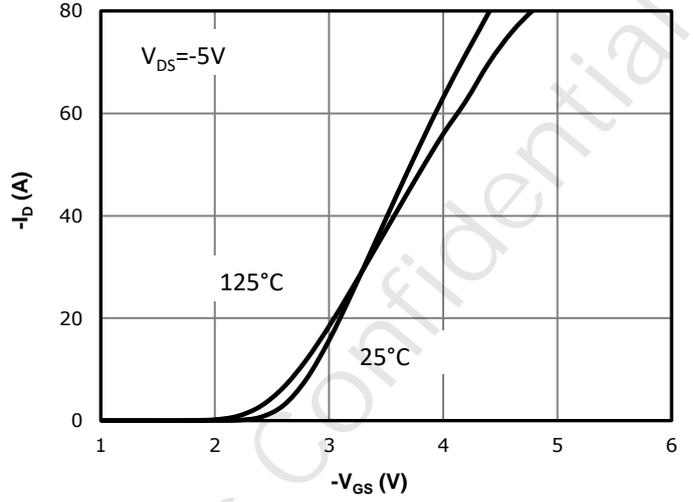


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

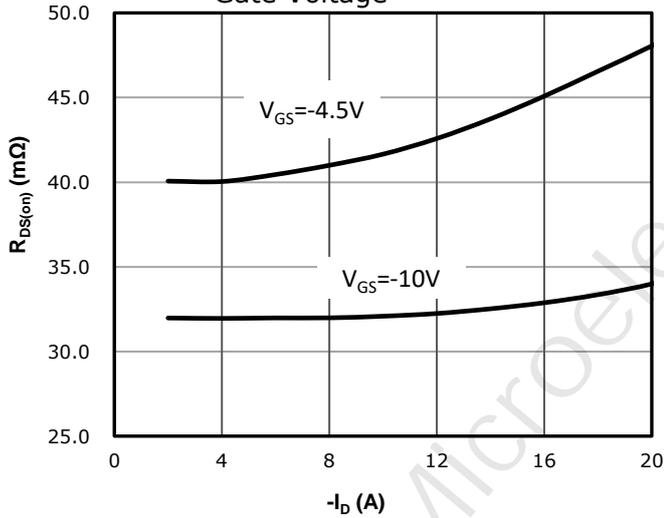


Fig 4: $R_{DS(on)}$ vs Gate Voltage

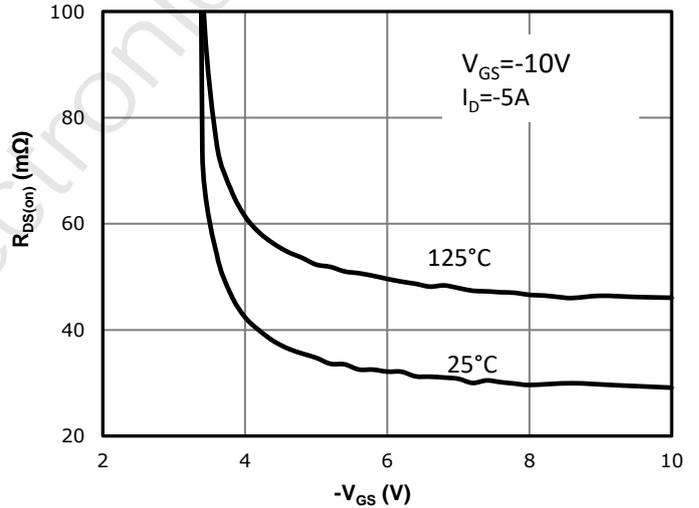


Fig 5: $R_{DS(on)}$ vs. Temperature

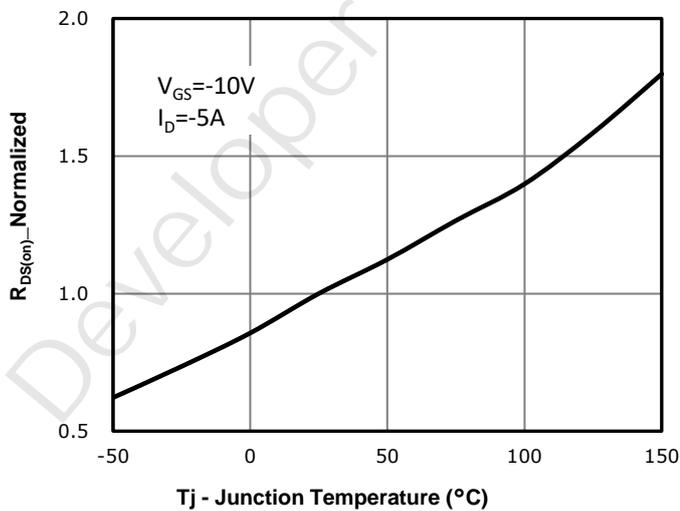


Fig 6: Capacitance Characteristics

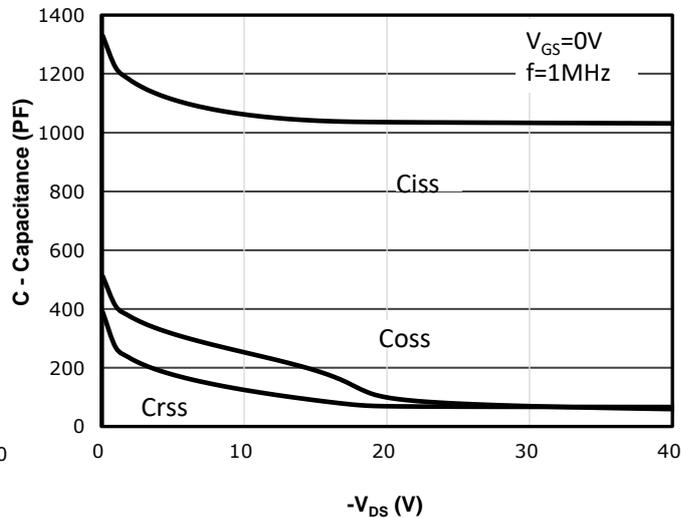


Fig 7: Gate Charge Characteristics

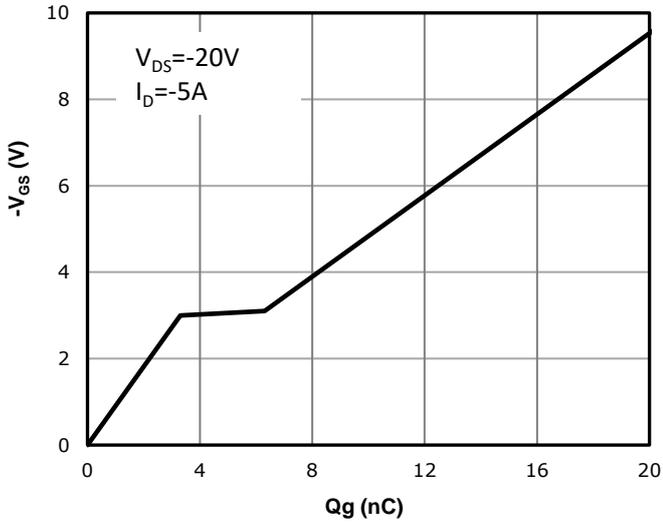


Fig 8: Body-diode Forward Characteristics

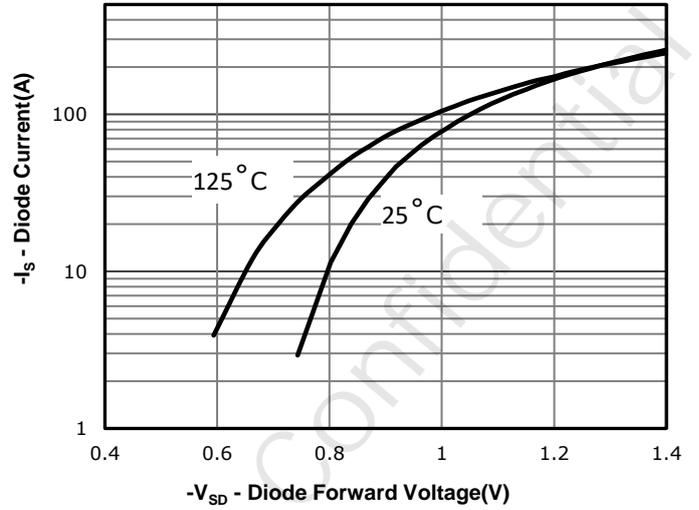


Fig 9: Power Dissipation

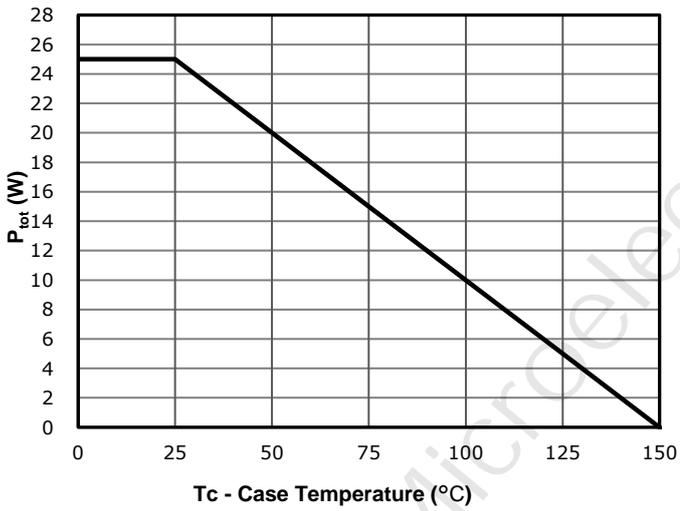


Fig 10: Drain Current Derating

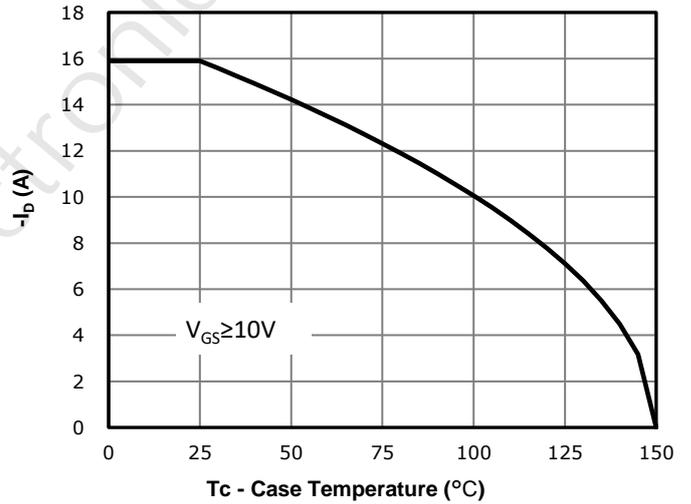


Fig 11: Safe Operating Area

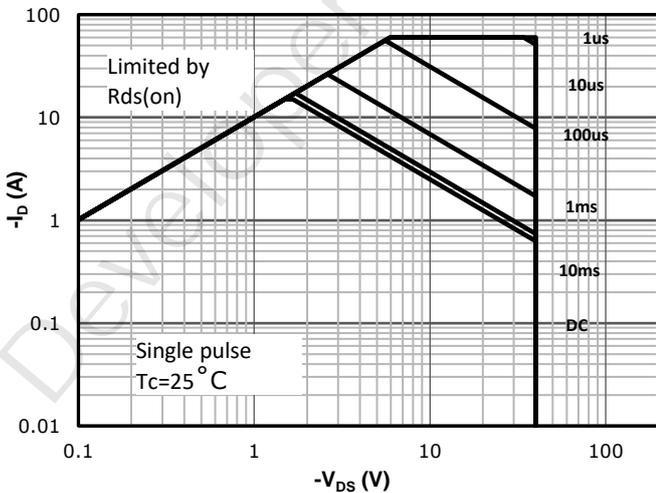
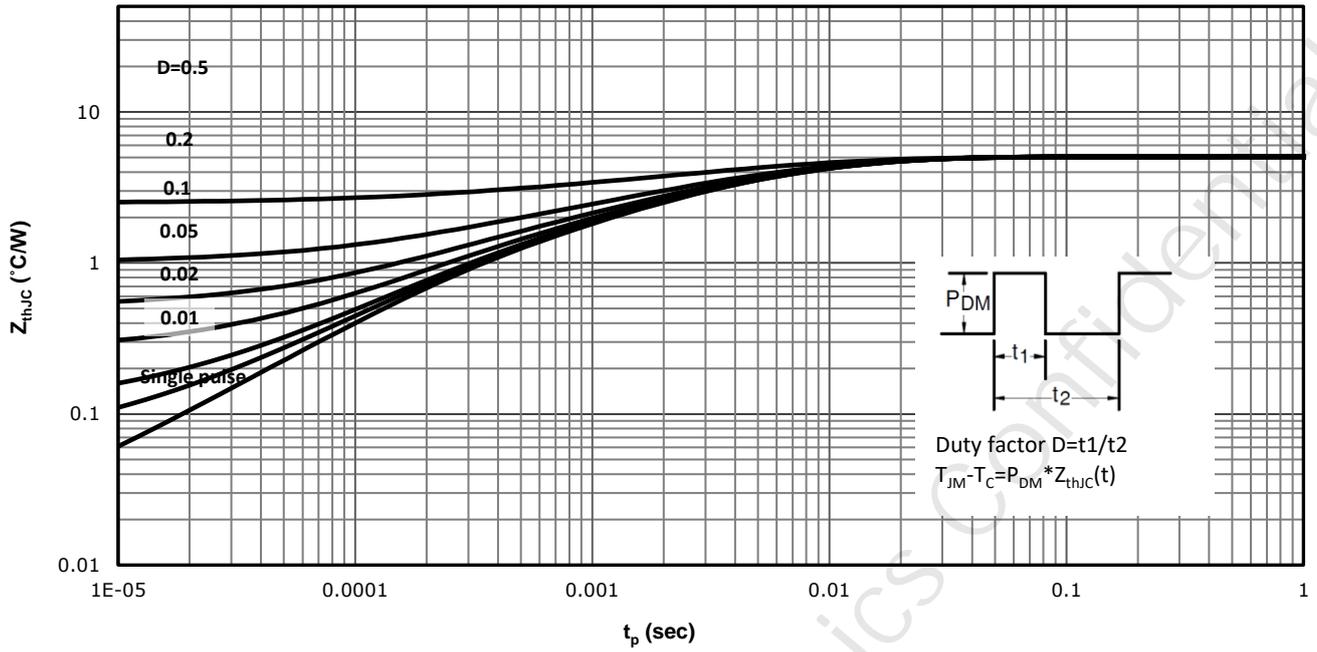
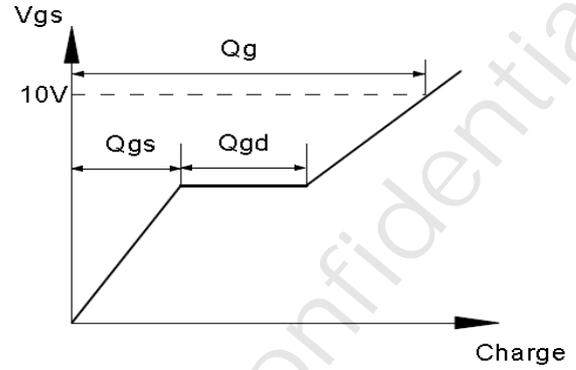
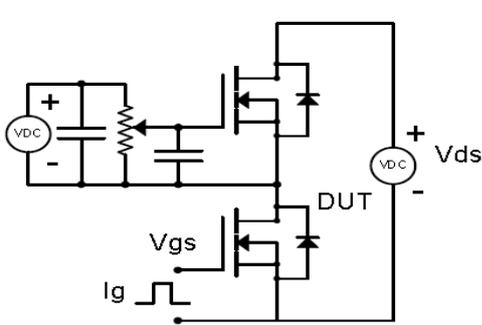


Fig 12: Max. Transient Thermal Impedance

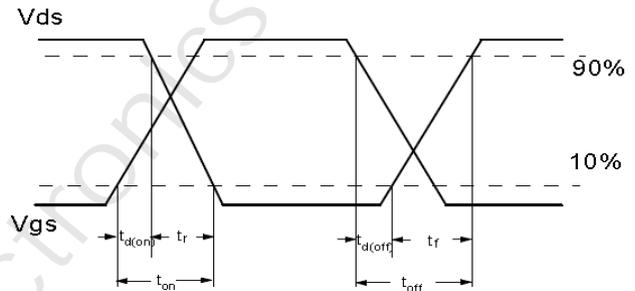
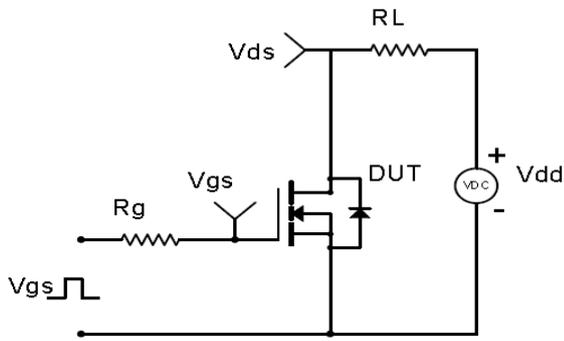


Test Circuit & Waveform

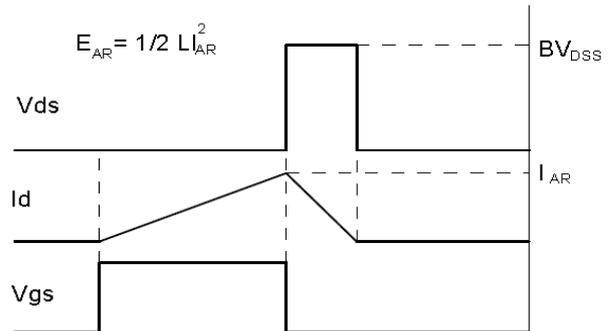
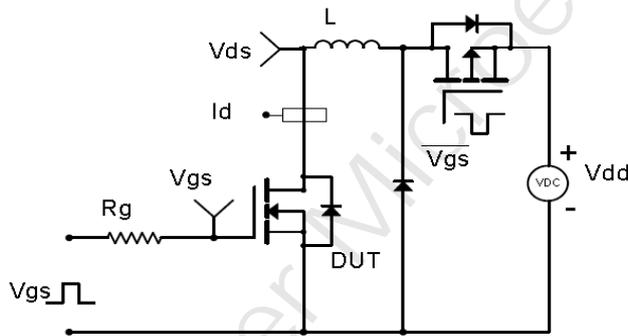
Gate Charge Test Circuit & Waveform



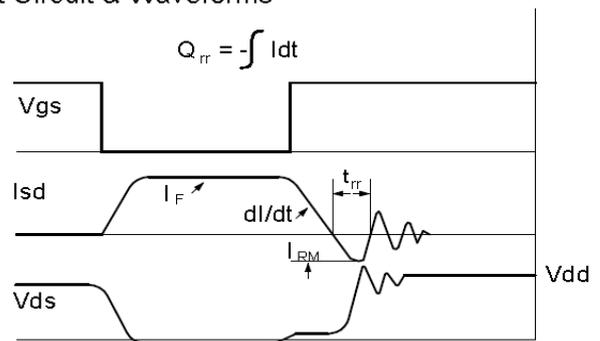
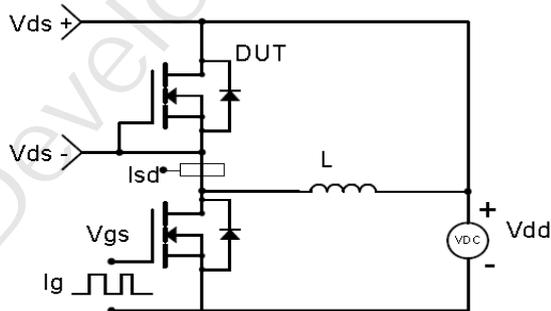
Resistive Switching Test Circuit & Waveforms



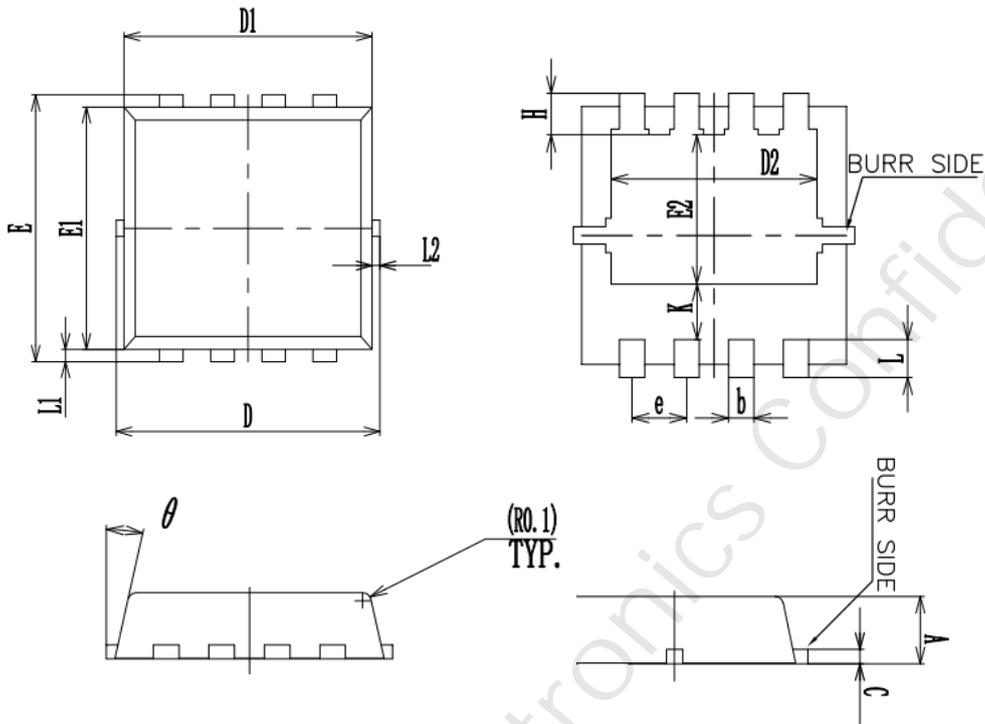
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

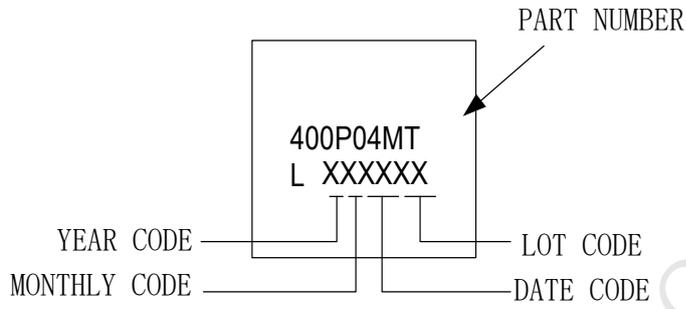


Package Outline: DFN 3.3x3.3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.70	0.90	0.028	0.035
b	0.25	0.35	0.010	0.014
c	0.14	0.15	0.006	0.006
D	3.15	3.30	0.124	0.130
D1	3.05	3.15	0.120	0.124
D2	2.35	2.45	0.093	0.096
e	0.65 BSC		0.026 BSC	
E	3.20	3.30	0.126	0.130
E1	2.90	3.00	0.114	0.118
E2	1.64	1.74	0.065	0.069
H	0.38	0.48	0.015	0.019
K	0.59	0.69	0.023	-
L	0.25	0.40	0.010	0.016
L1	0.10	0.15	0.004	0.006
L2	-	0.15	-	0.006
θ	8°	12°	-	-

Part Marking Information



Developer Microelectronics Confidential

Revision History

Revision	Major changes
1.0	Release for formal version

重要声明 Important Notice

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