

40V N-Channel Enhancement Mode MOSFET

Description

The AP420N04TLG5 uses advanced **APM-SGT V** technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 40V$ $I_D = 420A$

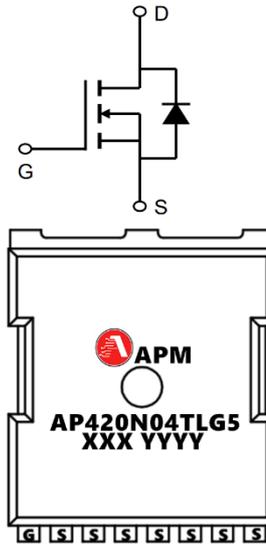
$R_{DS(ON)} < 0.78m\Omega$ @ $V_{GS}=10V$ (Type: **0.65m Ω**)

Application

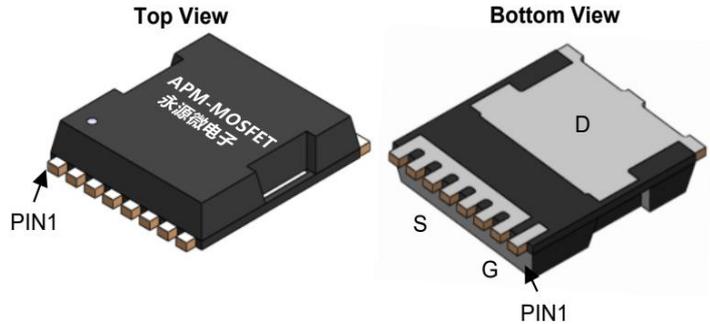
BMS

BLDC

UPS



TOLLA



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP420N04TLG5	TOLLA-8L	AP420N04TLG5 XXX YYYY	2000

Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_{D@TC=25^\circ C}$	Continuous Drain Current, $V_{GS} @ 10V$	420	A
$I_{D@TC=100^\circ C}$	Continuous Drain Current, $V_{GS} @ 10V$	307	A
I_{DM}	Pulsed Drain Current	1943	A
E_{AS}	Single Pulsed Avalanche Energy	1488	mJ
I_{AS}	Avalanche Current	50	A
$P_{D@TC=25^\circ C}$	Power Dissipation	278	W
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	35	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.45	$^\circ C/W$

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Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	48	-	V
IDSS	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V,$	-	-	1.0	μA
IGSS	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}= \pm 20V$	-	-	± 100	nA
VGS(th)	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
RDS(on)	Static Drain-Source on-Resistance	$V_{GS}=10V, I_D=30A$	-	0.65	0.78	m Ω
Ciss	Input Capacitance	$V_{DS}=20V, V_{GS}=0V,$ $f=1.0MHz$	-	7400	-	pF
Coss	Output Capacitance		-	3354	-	pF
Crss	Reverse Transfer Capacitance		-	223	-	pF
Qg	Total Gate Charge	$V_{GS} = 0 \text{ to } 10V, V_{DS} = 20V, I_D = 20A$	-	112	-	nC
Qgs	Gate-Source Charge		-	20	-	nC
Qgd	Gate-Drain("Miller") Charge		-	15	-	nC
td(on)	Turn-on Delay Time	$V_{GS} = 10V, V_{DD} = 20V$ $I_D = 20A, R_{GEN} = 3\Omega$	-	14	-	ns
tr	Turn-on Rise Time		-	35	-	ns
td(off)	Turn-off Delay Time		-	96	-	ns
tr	Turn-off Fall Time		-	77	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	420	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	1943	A
VSD	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=30A$	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	$T_J=25^\circ C,$ $I_F=I_S, dI/dt=100A/\mu s$	-	103	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	270	-	nC

Note :

- 1、 The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、 The EAS data shows Max. rating . The test condition is $V_{DD} = 32V, V_{GS} = 10V, L=0.5mH, I_{AS} = 50A$
- 4、 The power dissipation is limited by $150^\circ C$ junction temperature
- 5、 The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

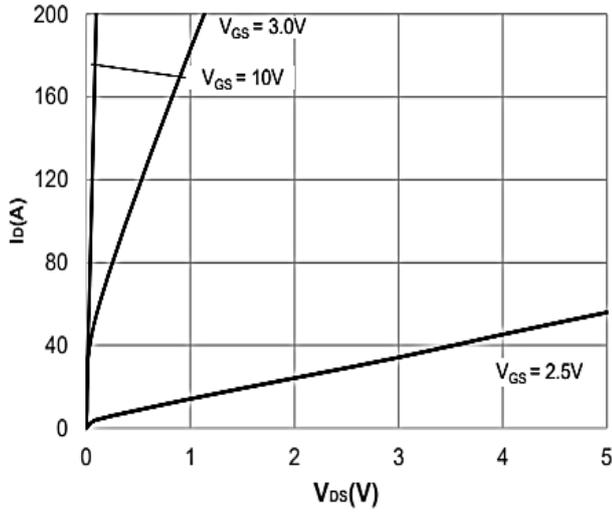


Figure1: Output Characteristics

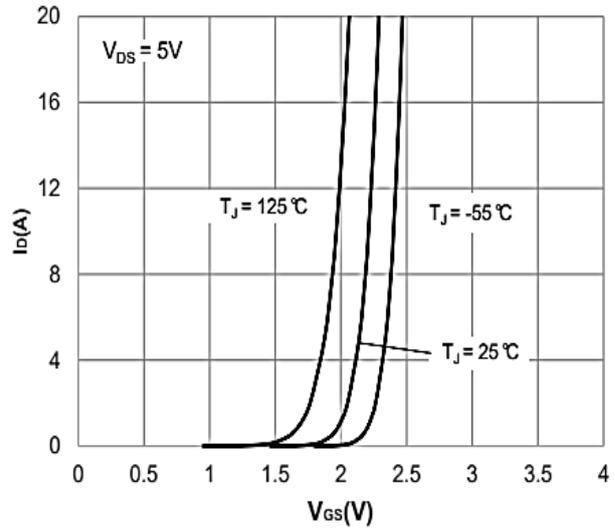


Figure 2: Typical Transfer Characteristics

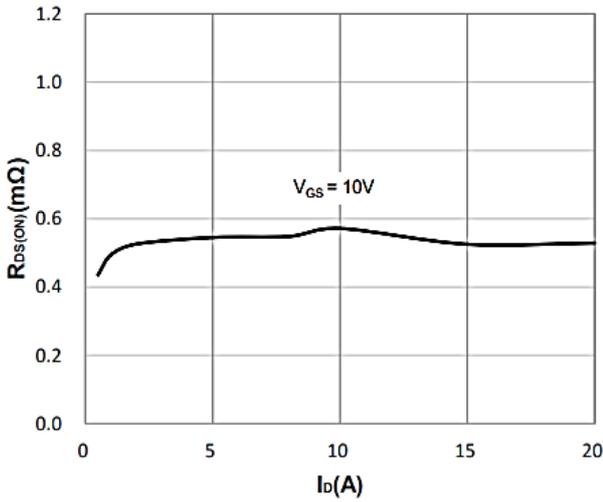


Figure 3: On-resistance vs. Drain Current

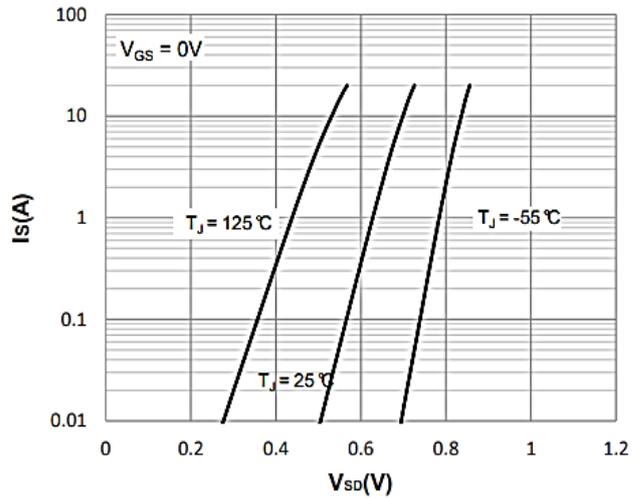


Figure 4: Body Diode Characteristics

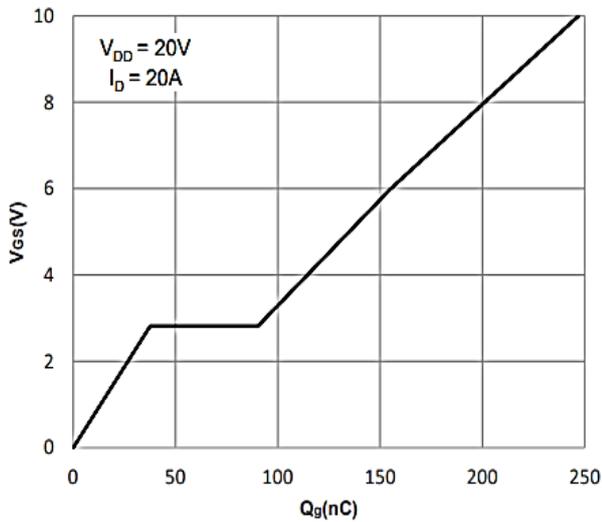


Figure 5: Gate Charge Characteristics

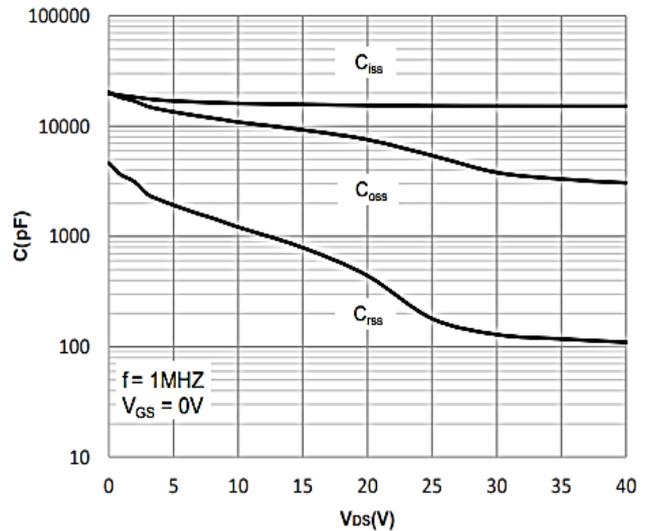


Figure 6: Capacitance Characteristics



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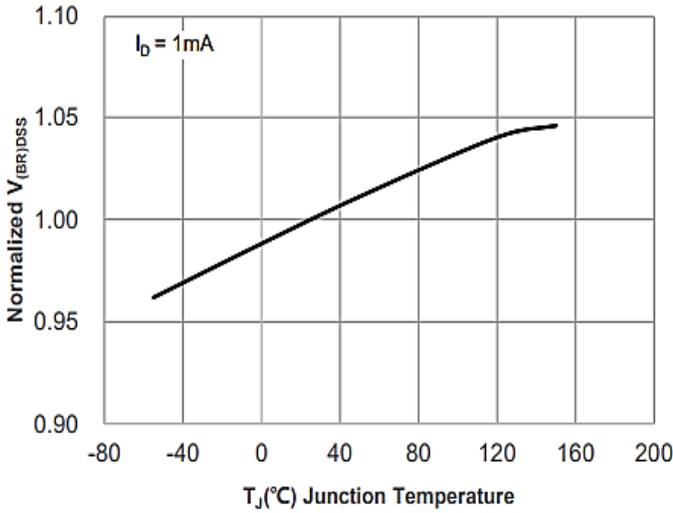


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

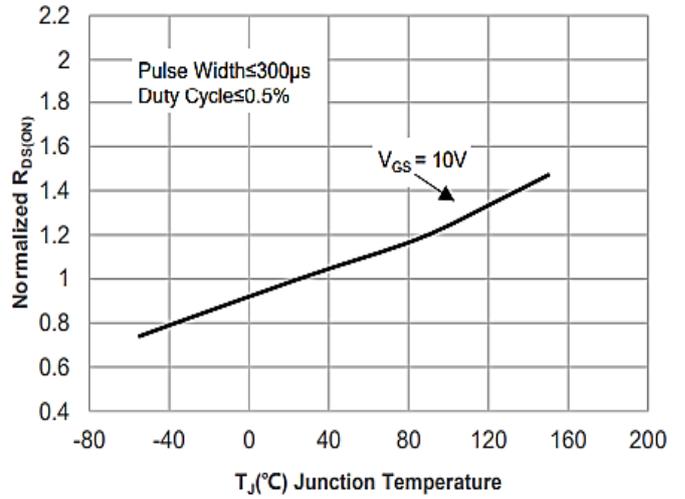


Figure 8: Normalized on Resistance vs. Junction Temperature

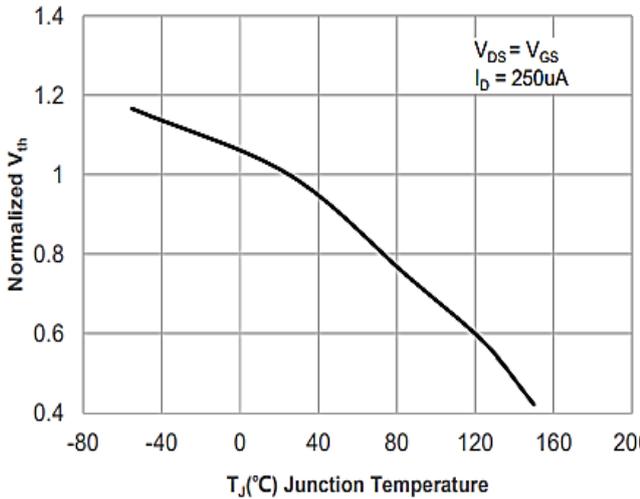


Figure 9: Maximum Safe Operating Area

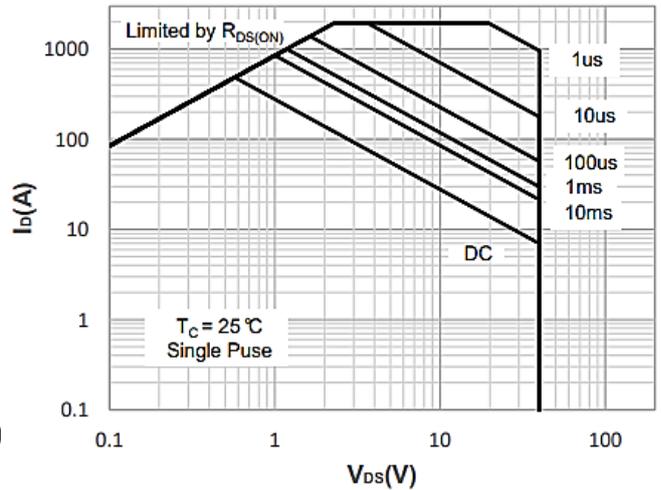


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

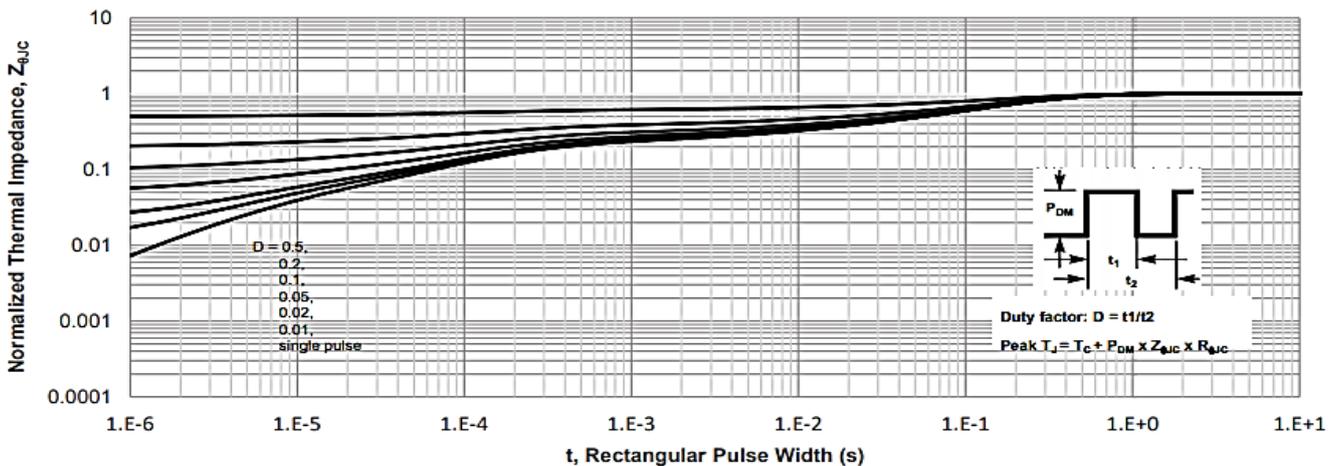
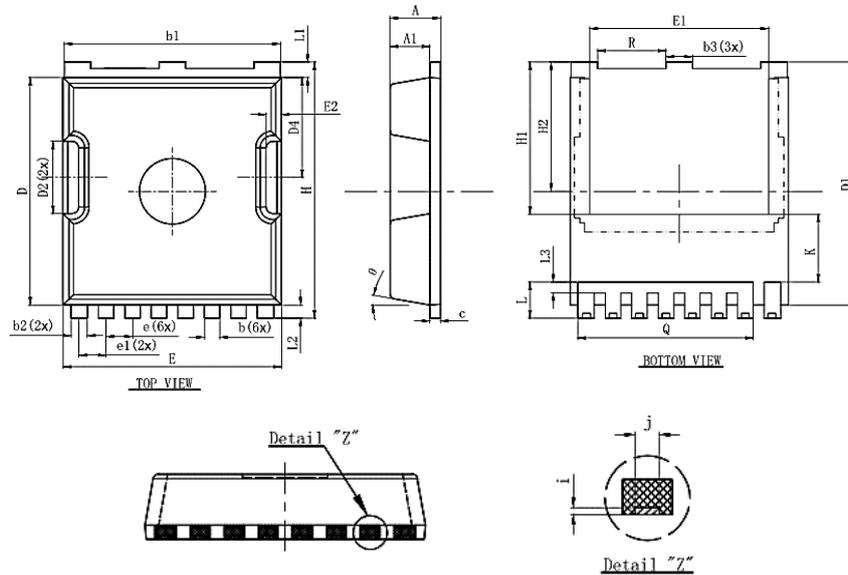


Figure 11: Normalized Maximum Transient Thermal Impedance

Package Mechanical Data-TOLLA-8-XZ Single



Symbol	Dimensions In Millimeters		
	Min.	Nom	Max.
A	2.2	2.3	2.4
A1	1.7	1.8	1.9
b	0.6	0.7	0.8
b1	9.7	9.8	9.9
b2	0.65	0.75	0.85
b3	1.1	1.2	1.3
C	0.4	0.5	0.6
D	10.3	10.4	10.5
D1	11.0	11.1	11.2
D2	3.2	3.3	3.4
D4	4.47	4.57	4.67
E	9.8	9.9	10.0
E1	8.0	8.1	8.2
E2	0.5	0.6	0.7
e	1.200 (BSC)		
e1	1.225 (BSC)		
H	11.6	11.7	11.8
H1	6.95BSC		
H2	5.9BSC		
i	0.1REF		
j	0.350REF		
K	3.100REF		
L	1.55	1.65	1.75
L1	0.6	0.7	0.8
L2	0.5	0.6	0.7
L3	0.4	0.5	0.6
Q	7.95REF		
R	3.0	3.1	3.2
θ	10°REG		

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Edition	Date	Change
REV1.0	2024/2/31	Initial release

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