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TPM20NP4D6

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

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Application

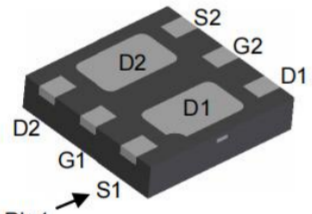
- Reverse Battery protection
- Load switch
- Power management
- Motor Control
- Portable Power Adaptors

Product Summary

Device	BV_{DSS}	$R_{DS(ON)}$ max	I_D MAX T_A = 25°C
Q1 N-Channel	20V	20mΩ @ V_{GS} = 4.5V	5.5A
		28mΩ @ V_{GS} = 2.5V	3.5A
Q2 P-Channel	-20V	60mΩ @ V_{GS} = -4.5V	-5.0A
		68mΩ @ V_{GS} = -2.5V	-3.0A

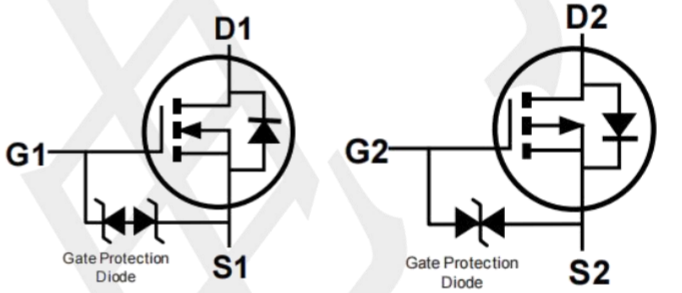
Package and Pin Configuration

U-DFN2020-6
(Type B)



Bottom View

Circuit diagram



N-CHANNEL MOSFET P-CHANNEL MOSFET

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Characteristic			Symbol	Q1 N-CHANNEL	Q2 P-CHANNEL	Unit
Drain-Source Voltage			VDSS	20	-20	V
Gate-Source Voltage			V_{GSS}	±12	±12	V
Continuous Drain Current N-Channel: VGS = 4.5V P-Channel: VGS = -4.5V	Steady State	TA=25℃	I_D	5.5	-5.0	A
		TA=70℃		4.6	-4.0	A
Maximum Continuous Body Diode Forward Current (Note 1)			I_S	2.5	-2.0	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I_{DM}	28	-26	A

Thermal Characteristic

PARAMETER	Symbol	Value	Unit
Total Power Dissipation (Note 1)	P_D	1.36	W
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	92	°C/W
Thermal Resistance, Junction to Case (Note 1)	$R_{\theta JC}$	18	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes: 1. Device mounted on 1" × 1" FR-4 PCB with high coverage 2oz. Copper, single sided.

Electrical Characteristics Q1 N-CHANNEL (@ TA = +25°C, unless otherwise specified.)

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note 2)						
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	BVDSS	20	--	--	V
Zero Gate Voltage Drain Current TJ = +25°C	V_{DS}=20V ,V_{GS}= 0V	I_{DSS}	--	--	1	μA
Gate-Source Leakage	V_{DS}=0V, V_{GS}= ±8V	I_{GSS}	--	--	±100	nA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	V_{DS} = V_{GS}, ID = 250μA	$V_{GS(TH)}$	0.45	--	1.0	V
Static Drain-Source On-Resistance	V_{GS}=4.5V,I_D=5A	R_{DS}(on)	--	16	20	mΩ
	V_{GS}=2.5V,I_D=3A		--	22	28	
Diode Forward Voltage	V_{GS} = 0V, IS = 4.8A	VSD	--	0.7	1.2	V
DYNAMIC CHARACTERISTICS (Note 3)						
Input Capacitance	V_{DS} = 10V,	Ciss	--	700	--	pF
Output Capacitance	V_{GS} = 0V,	Coss	--	92	--	
Reverse Transfer Capacitance	f = 1.0MHz	Crss	--	80	--	
Total Gate Charge (V_{GS} = 4.5V)	VDS = 10V, ID =5A	Qg	--	9.4	--	nC
Total Gate Charge (VGS = 8V)			--	18	--	
Gate-Source Charge		Qgs	--	0.6	--	
Gate-Drain Charge		Qgd	--	2	--	
Turn-On Delay Time	VDD = 10V, VGS = 4.5V,	$t_{D(ON)}$	--	5	--	nS
Turn-On Delay Time	I_D=1A, RG = 1Ω	t_R	--	14.4	--	
Turn-Off Delay Time		$t_{D(OFF)}$	--	30	--	
Turn-Off Fall Time		t_F	--	9.2	--	
Body Diode Reverse Recovery Time	IS = 5A, dI/dt = 100A/μs	t_{RR}	--	7.6	--	
Body Diode Reverse Recovery Charge	IS = 5A, dI/dt = 100A/μs	QRR	--	0.9	--	nC

Notes: 2. Short duration pulse test used to minimize self-heating effect.
3. Guaranteed by design. Not subject to product testing.

Electrical Characteristics Q2 P-CHANNEL (@ TA = +25°C, unless otherwise specified.)

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note 2)						
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	BVDSS	-20	--	--	V
Zero Gate Voltage Drain Current TJ = +25°C	V_{DS}=-20V ,V_{GS}= 0V	I_{DSS}	--	--	-1	μA
Gate-Source Leakage	V_{DS}=0V, V_{GS}= ±8V	I_{GSS}	--	--	±100	nA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	V_{DS} = V_{GS}, ID =- 250μA	$V_{GS(TH)}$	-0.45	--	-1.0	V
Static Drain-Source On-Resistance	V_{GS}=-4.5V,I_D=-5A	R_{DS}(on)	--	48	60	mΩ
	V_{GS}=-2.5V,I_D=-3A		--	55	68	
Diode Forward Voltage	V_{GS} = 0V, IS = -4.8A	VSD	--	-0.7	-1.2	V
DYNAMIC CHARACTERISTICS (Note 3)						
Input Capacitance	V_{DS} = -10V,	Ciss	--	710	--	pF
Output Capacitance	V_{GS} = 0V,	Coss	--	94	--	
Reverse Transfer Capacitance	f = 1.0MHz	Crss	--	85	--	
Total Gate Charge (V_{GS} = 4.5V)	VDS = -10V, ID =-5A	Qg	--	9.6	--	nC
Total Gate Charge (VGS = 8V)			--	19	--	
Gate-Source Charge		Qgs	--	0.8	--	
Gate-Drain Charge		Qgd	--	2.5	--	
Turn-On Delay Time	VDD = -10V,	$t_{D(ON)}$	--	5.6	--	nS
Turn-On Delay Time	VGS = -4.5V,	t_R	--	14.8	--	
Turn-Off Delay Time	I_D=-1A, RG = 1Ω	$t_{D(OFF)}$	--	35	--	
Turn-Off Fall Time		t_F	--	9.8	--	
Body Diode Reverse Recovery Time	Is = -5A, dI/dt = 100A/μs	t_{RR}	--	7.9	--	
Body Diode Reverse Recovery Charge	Is = -5A, dI/dt = 100A/μs	Q_{RR}	--	1.1	--	nC

Notes: 2. Short duration pulse test used to minimize self-heating effect.
3. Guaranteed by design. Not subject to product testing.

Typical Performance Characteristics(TA=25°C unless otherwise Specified)

Q1 N-CHANNEL

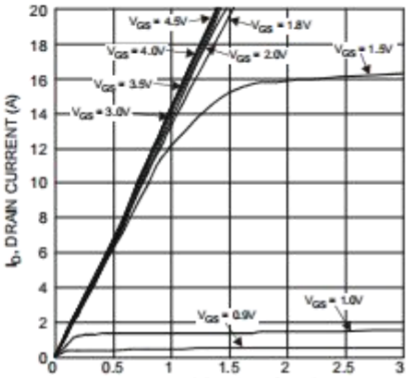


Figure 1 Typical Output Characteristics

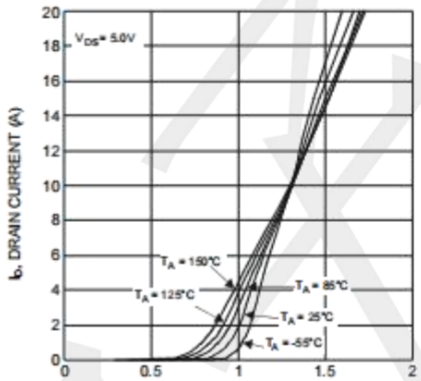


Figure 2 Typical Transfer Characteristics

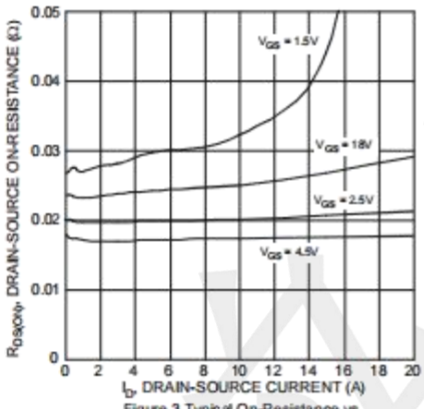


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

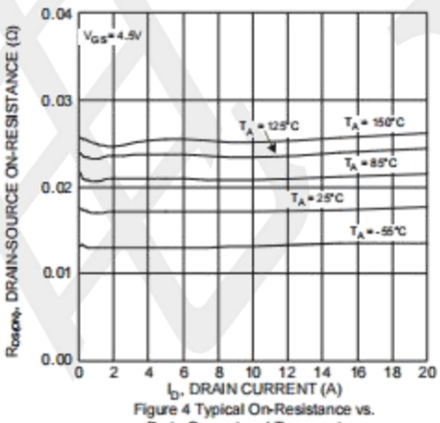


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

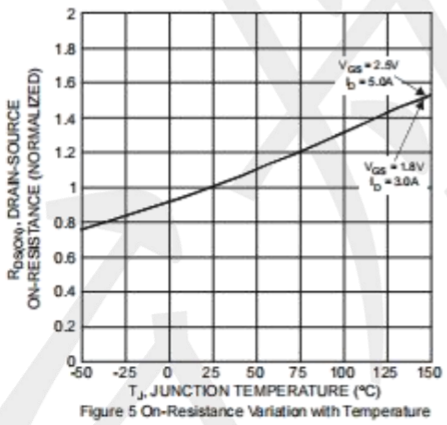


Figure 5 On-Resistance Variation with Temperature

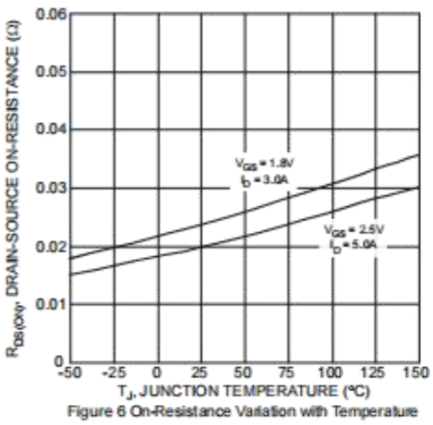
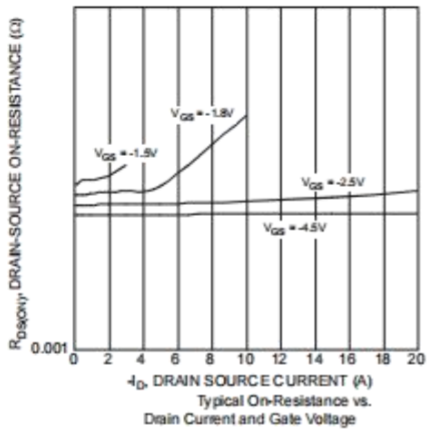


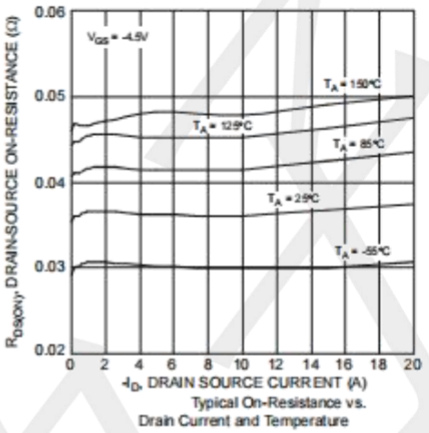
Figure 6 On-Resistance Variation with Temperature

Typical Performance Characteristics(TA=25°C unless otherwise Specified)

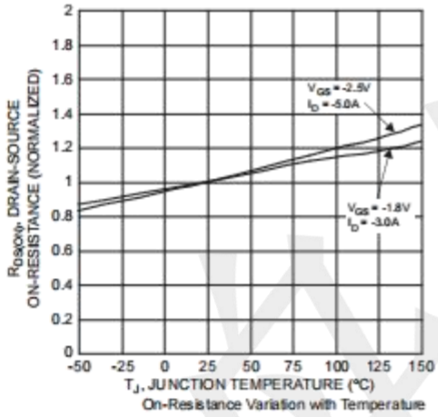
Q2 P-CHANNEL



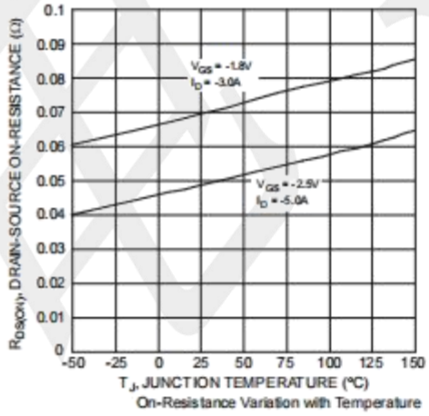
Typical On-Resistance vs.
Drain Current and Gate Voltage



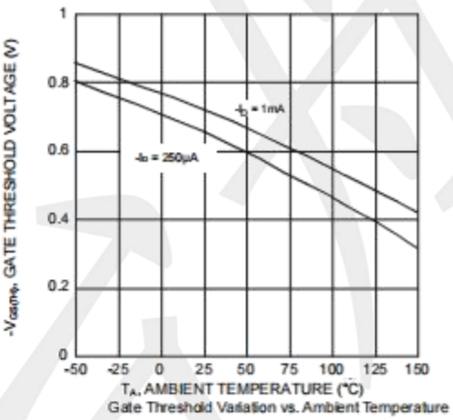
Typical On-Resistance vs.
Drain Current and Temperature



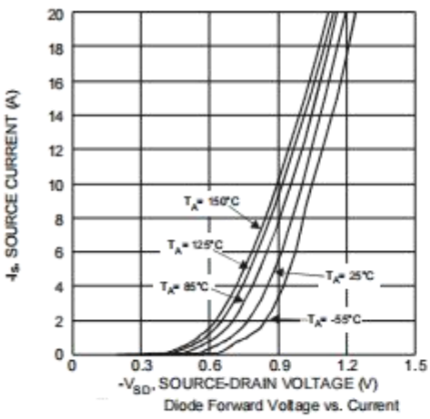
On-Resistance Variation with Temperature



On-Resistance Variation with Temperature



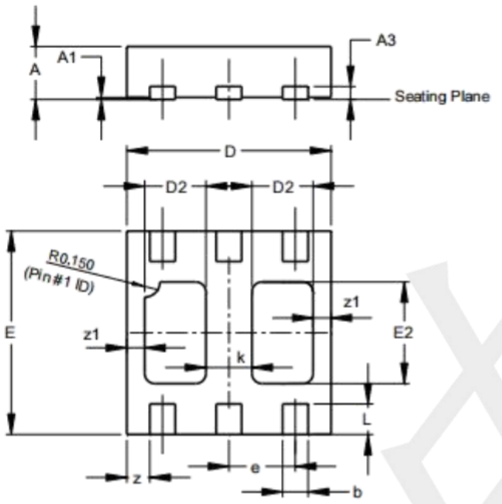
Gate Threshold Variation vs. Ambient Temperature



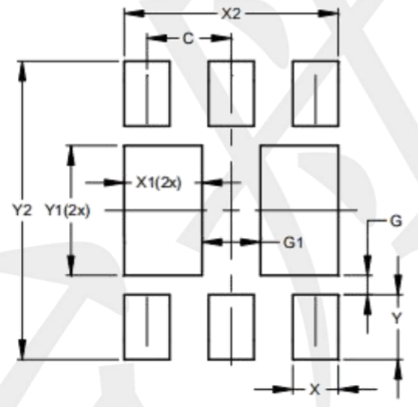
Diode Forward Voltage vs. Current

Package Outline Dimensions (Unit: mm)

DFN2020-6



U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			



Dimensions	Value (in mm)
C	0.650
G	0.150
G1	0.450
X	0.350
X1	0.600
X2	1.650
Y	0.500
Y1	1.000
Y2	2.300