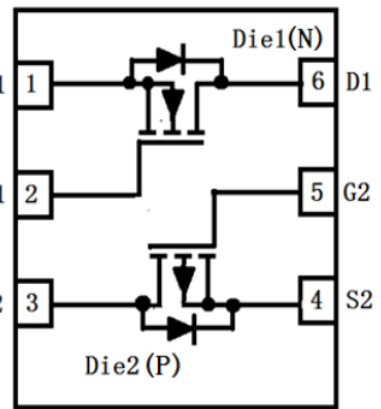
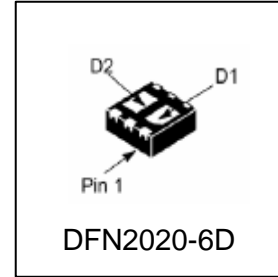


# LNP2010DT2AG

## N- AND P-Channel Enhancement Mode MOSFET

### 1. FEATURES

- P-Channel:  $V_{DS} = -20V$   
 $R_{DS(ON)}, V_{GS}@-4.5V, I_{DS}@-4.7A=70m\Omega$   
 $R_{DS(ON)}, V_{GS}@-2.5V, I_{DS}@-1.0A=110m\Omega$
- N-Channel:  $V_{DS} = 20V$   
 $R_{DS(ON)}, V_{GS}@2.5V, I_{DS}@5.2A = 50m\Omega$   
 $R_{DS(ON)}, V_{GS}@4.5V, I_{DS}@6A = 40m\Omega$
- Simple drive requirement.
- Low gate charge.
- Low on-resistance.
- Fast switching speed.
- We declare that the material of product compliance with RoHS requirements and Halogen Free.



### 2. DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
LNP2010DT2AG	T2	4000/Tape&Reel

### 3. MAXIMUM RATINGS( $T_a = 25^\circ C$ )

Parameter (P-Channel)	Symbol	Limits	Unit
Drain–Source Voltage	$V_{DSS}$	-20	V
Gate–to–Source Voltage – Continuous	$V_{GS}$	$\pm 12$	V
Drain Current			
– Continuous $T_A = 25^\circ C$	$I_D$	-4.7	A
– Pulsed(Note 1)	$I_{DM}$	-20	

Parameter (N-Channel)	Symbol	Limits	Unit
Drain–Source Voltage	$V_{DSS}$	20	V
Gate–to–Source Voltage – Continuous	$V_{GS}$	$\pm 12$	V
Drain Current			
– Continuous $T_A = 25^\circ C$	$I_D$	6	A
– Pulsed(Note 1)	$I_{DM}$	33	

1. Repetitive Rating: Pulse width limited by the Maximum junction temperature.

**4. THERMAL CHARACTERISTICS**

Parameter	Symbol	Limits	Unit
Maximum Power Dissipation(Note 2)	PD	1.38	W
Thermal Resistance,Junction-to-Ambient	R $\theta$ JA	90	$^{\circ}$ C/W
Thermal Resistance,Junction-to-Ambient(Note 3)	R $\theta$ JA	160	
Junction and Storage temperature	T <sub>J</sub> ,T <sub>stg</sub>	-55~+150	$^{\circ}$ C

2.Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board, t  $\leq$  5 sec.

3.Surface mounted on FR4 board using the recommended pad size.

**5. ELECTRICAL CHARACTERISTICS (Ta= 25 $^{\circ}$ C)**
**P-Channel**

Characteristic	Symbol	Min.	Typ.	Max.	Unit
<b>STATIC</b>					
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 $\mu$ A)	V <sub>BRDSS</sub>	-20	-	-	V
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 $\mu$ A)	V <sub>GS(th)</sub>	-0.6	-0.85	-1.4	V
Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0, V <sub>DS</sub> = -20 V)	I <sub>DSS</sub>	-	-	-1	$\mu$ A
Gate-to-Source Leakage Current (V <sub>DS</sub> = 0 V, V <sub>GS</sub> = $\pm$ 12 V)	I <sub>GSS</sub>	-	-	$\pm$ 100	nA
Drain-to-Source On Resistance(Note 4) (V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -4.7 A) (V <sub>GS</sub> = -2.7 V, I <sub>D</sub> = -3.8 A) (V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -1.0 A)	R <sub>DS(on)</sub>	-	58 63 75	70 90 110	m $\Omega$
Forward Voltage (V <sub>GS</sub> = 0 V, I <sub>SD</sub> = -1.7 A)	V <sub>SD</sub>	-	-	-1.2	V
<b>DYNAMIC</b>					
Total Gate Charge	(V <sub>GS</sub> = -10 V, V <sub>DS</sub> = -4.7 V, I <sub>D</sub> = -4.5 A)	Q <sub>g</sub>	-	13.9	-
Gate-to-Source Gate Charge		Q <sub>gs</sub>	-	1.02	-
Gate-to-Drain Charge		Q <sub>gd</sub>	-	1.94	-
Turn-On Delay Time	(V <sub>DD</sub> = -10 V, R <sub>L</sub> = 10 $\Omega$ , I <sub>D</sub> = -1 A, V <sub>GEN</sub> = -4.5 V, R <sub>G</sub> = 6.2 $\Omega$ )	t <sub>d(on)</sub>	-	16.5	-
Rise Time		t <sub>r</sub>	-	23.4	-
Turn-Off Delay Time		t <sub>d(off)</sub>	-	66.5	-
Fall Time		t <sub>f</sub>	-	33.3	-
Input Capacitance (V <sub>DS</sub> = -8 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz)	C <sub>iss</sub>	-	751	-	pF
Output Capacitance (V <sub>DS</sub> = -8 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz)	C <sub>oss</sub>	-	91	-	
Reverse Transfer Capacitance (V <sub>DS</sub> = -8 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz)	C <sub>rss</sub>	-	84	-	

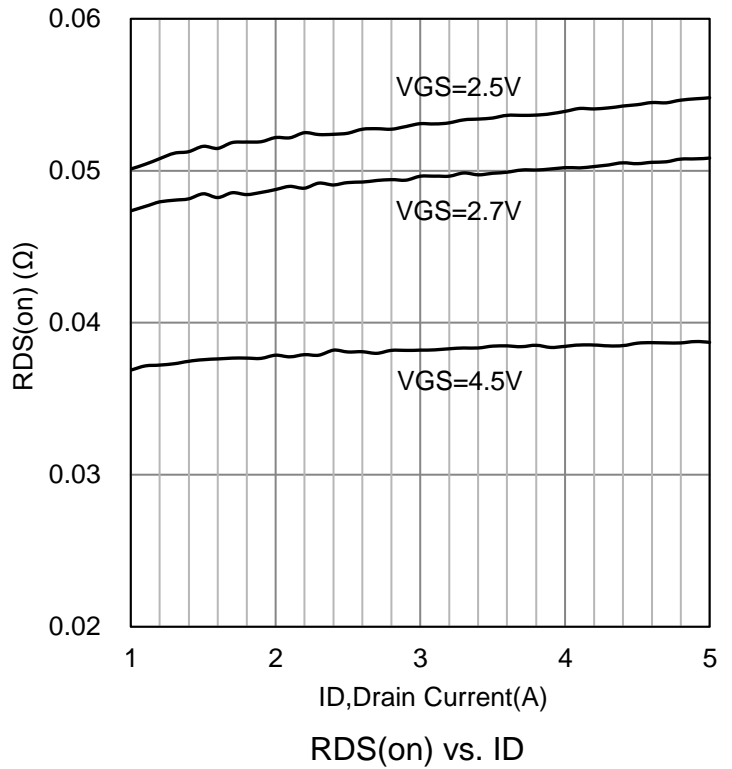
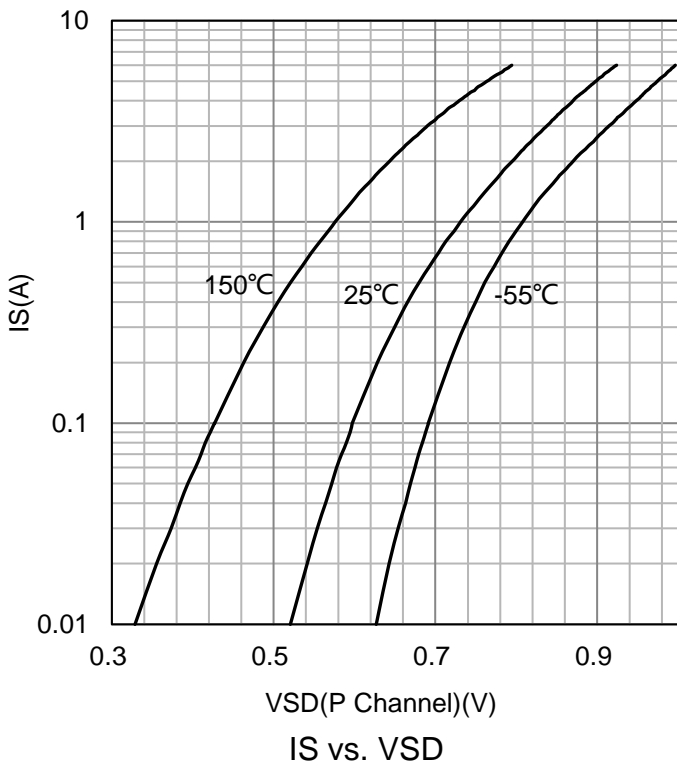
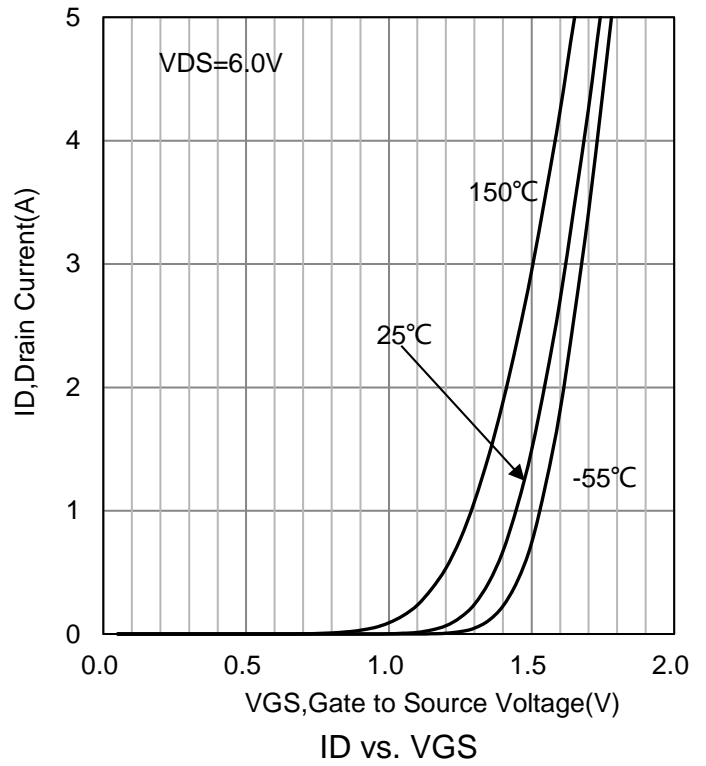
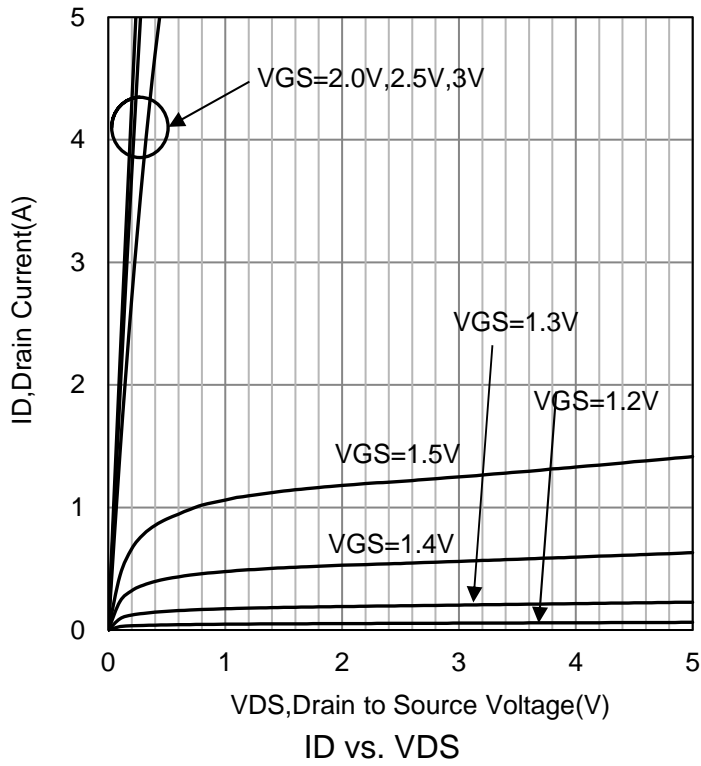
**5. ELECTRICAL CHARACTERISTICS (Ta= 25°C)(Con.)**
**N-Channel**

Characteristic	Symbol	Min.	Typ.	Max.	Unit	
<b>Static</b>						
Drain–Source Breakdown Voltage (VGS = 0 V, ID = 250 μA)	V(BR)DSS	20	-	-	V	
Drain-Source On-State Resistance(Note 4) (VGS = 2.5 V, ID= 5.2 A) (VGS = 4.5 V, ID = 6 A)	RDS(on)	- -	42 33	50 40	mΩ	
Gate Threshold Voltage (VDS = VGS, ID = 250 μA)	VGS(th)	0.4	-	1	V	
Zero Gate Voltage Drain Current (VDS= 20 V, VGS= 0 V)	IDSS	-	-	1	μA	
Gate Body Leakage (VDS = 0 V, VGS = ±12 V)	IGSS	-	-	±100	nA	
<b>DYNAMIC(Note 3)</b>						
Total Gate Charge	(VDS = 10V, ID = 6 A, VGS = 4.5 V)	Qg	-	6.8	-	nC
Gate-to–Source Gate Charge		Qgs	-	1	-	
Gate-to–Drain Charge		Qgd	-	2	-	
Turn-On Delay Time	(VDD = 10 V, ID = 1 A, VGS = 4.5 V, RG = 6.2Ω)	td(on)	-	10.8	-	ns
Rise Time		tr	-	15.3	-	
Turn-Off Delay Time		td(off)	-	76.7	-	
Fall Time		tf	-	23.8	-	
Input Capacitance (VDS = 8 V, VGS = 0 V, f = 1.0 MHz)	Ciss	-	636	-	pF	
Output Capacitance (VDS = 8 V, VGS = 0 V, f = 1.0 MHz)	Coss	-	62.8	-		
Reverse Transfer Capacitance (VDS = 8 V, VGS = 0 V, f = 1.0 MHz)	Crss	-	59.6	-		
<b>SOURCE–DRAIN DIODE</b>						
Max. Diode Forward Current	IS	-	-	1.7	A	
Forward Voltage (VGS = 0 V, IS = 1.7 A)	VSD	-	-	1.2	V	

4.Pulse Test: Pulse Width ≤300 μs, Duty Cycle ≤2.0%.

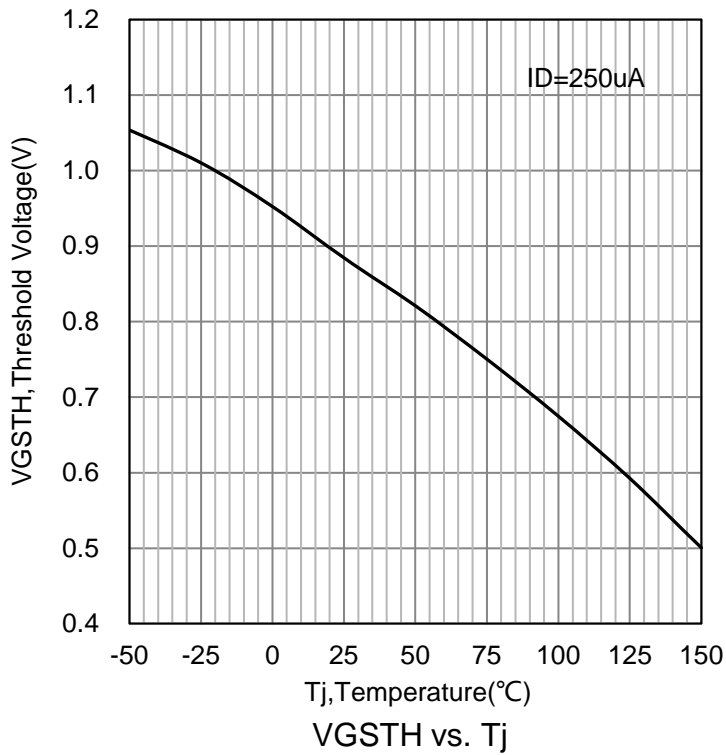
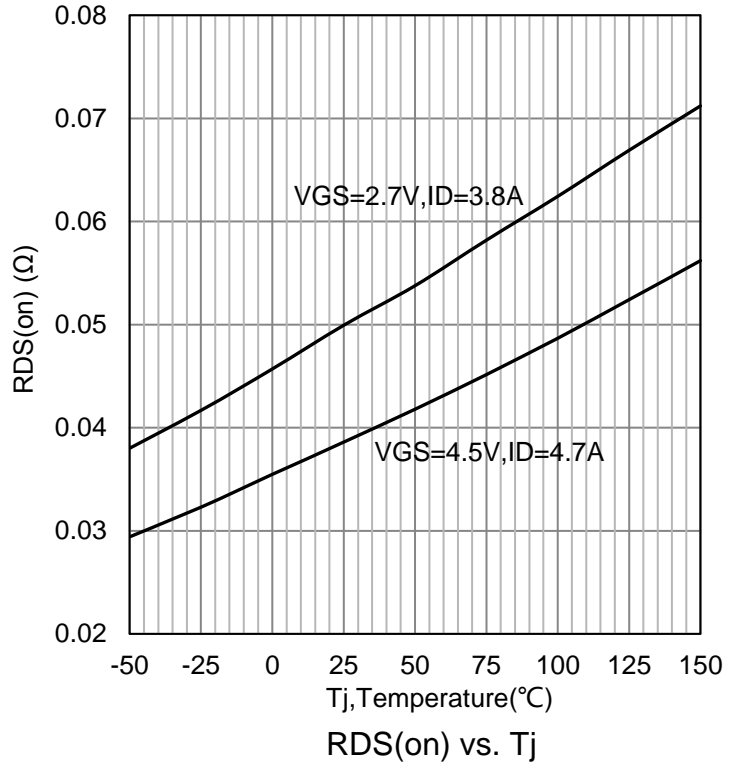
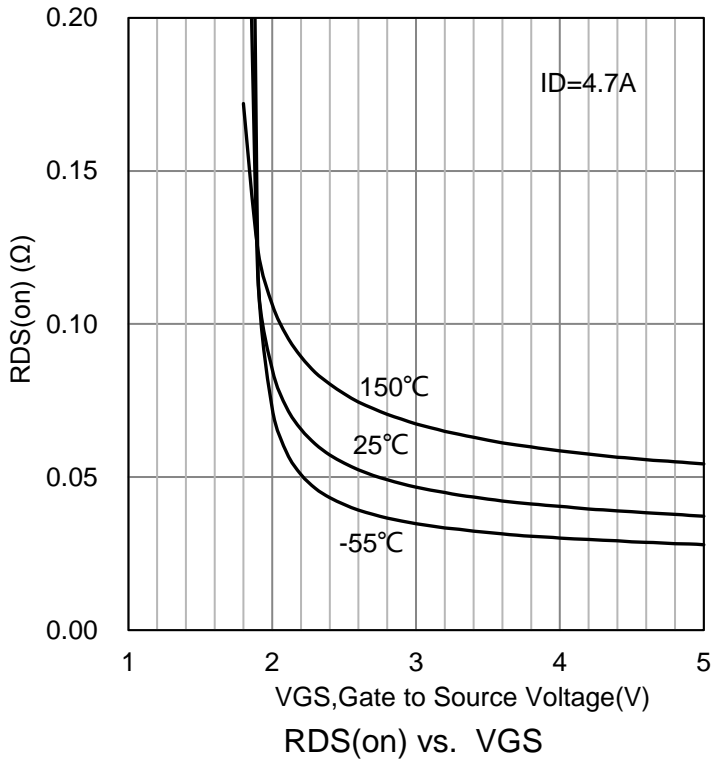
## 6. ELECTRICAL CHARACTERISTICS CURVES

P-Channel



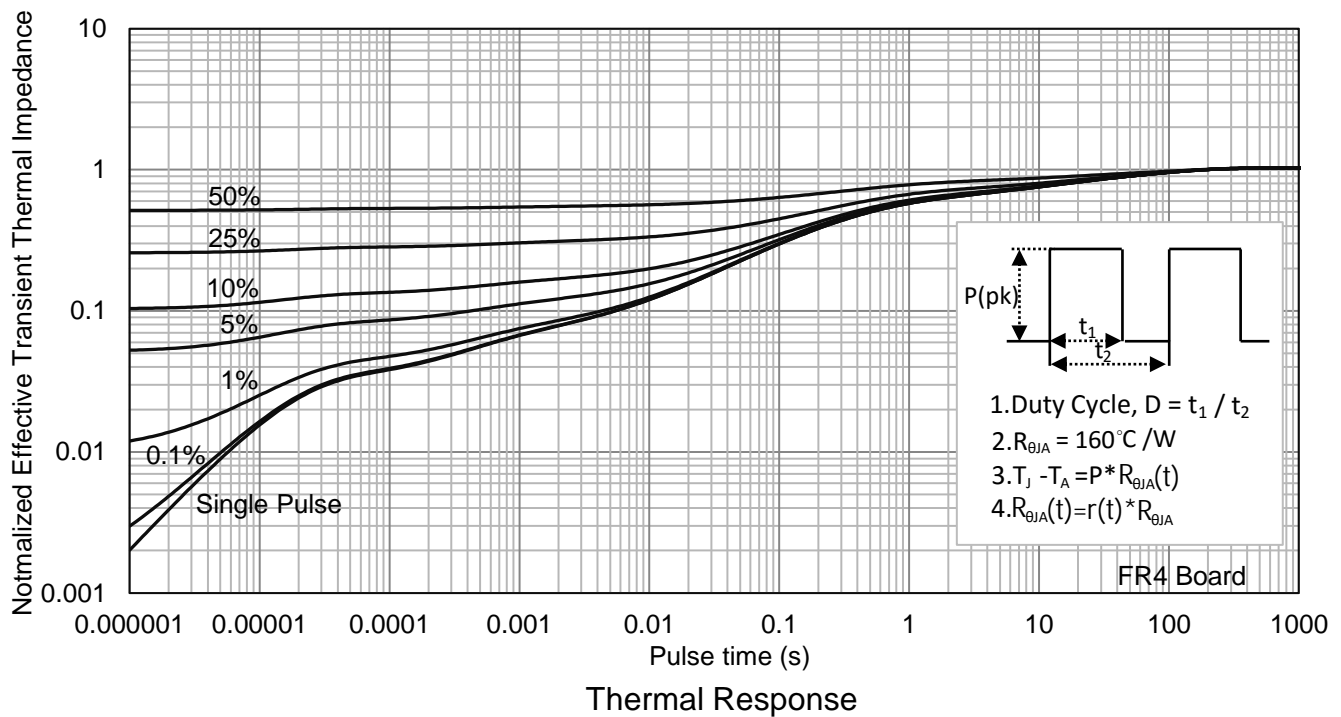
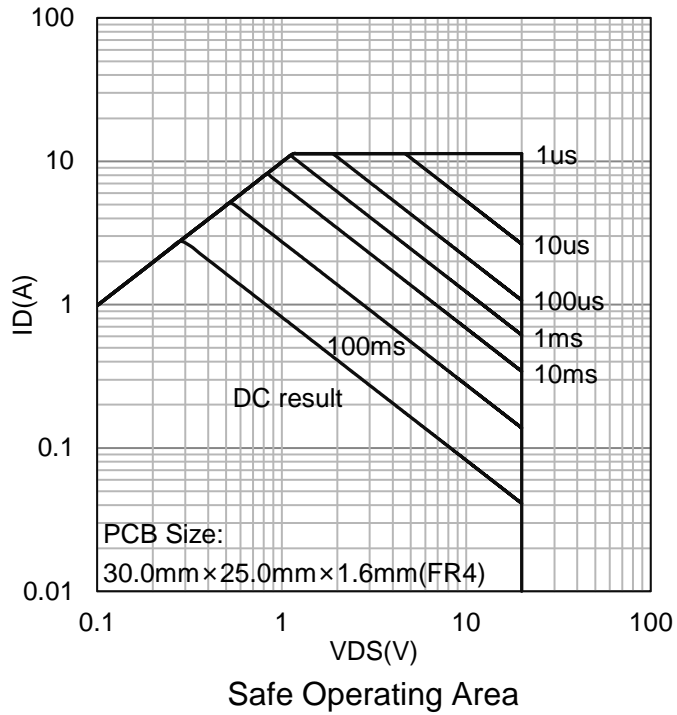
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P-Channel



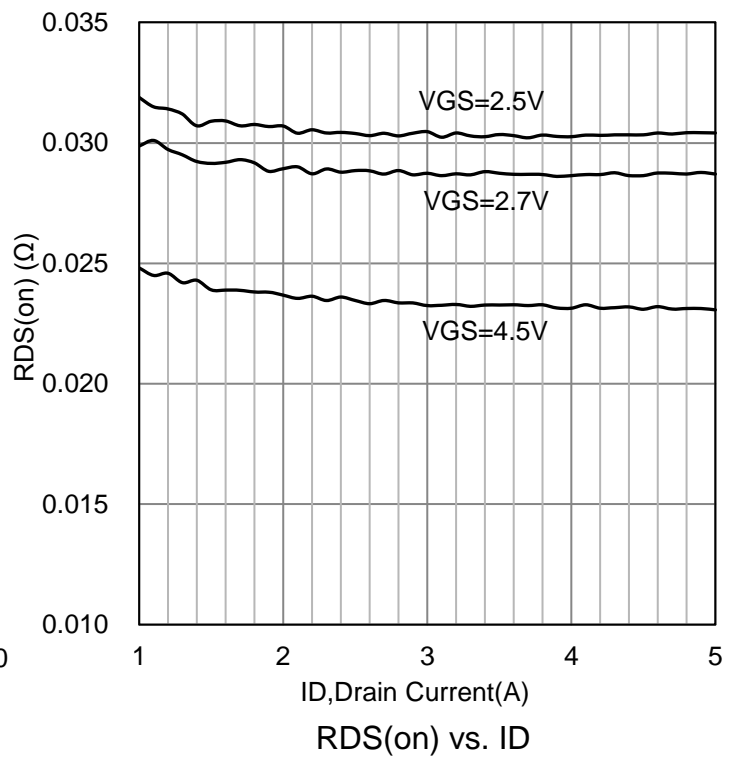
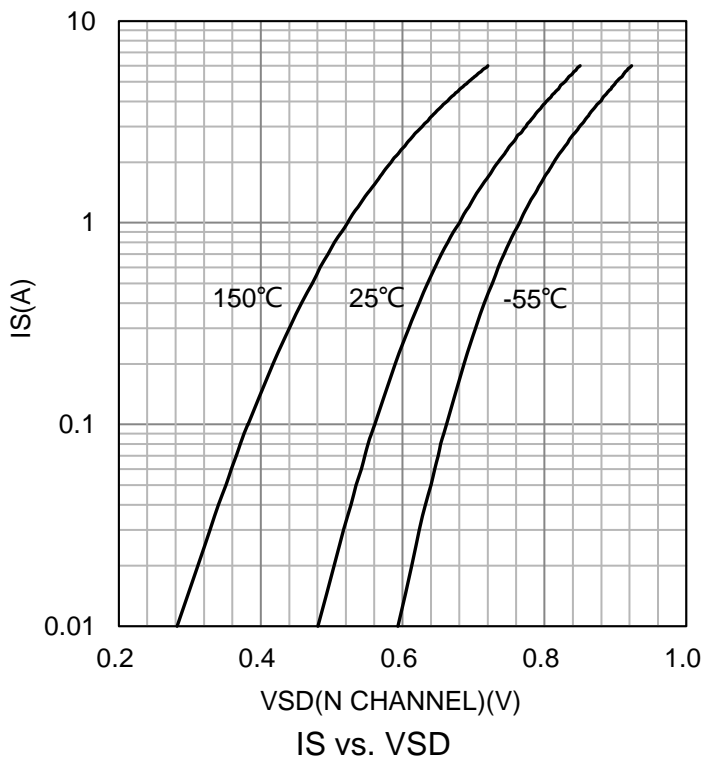
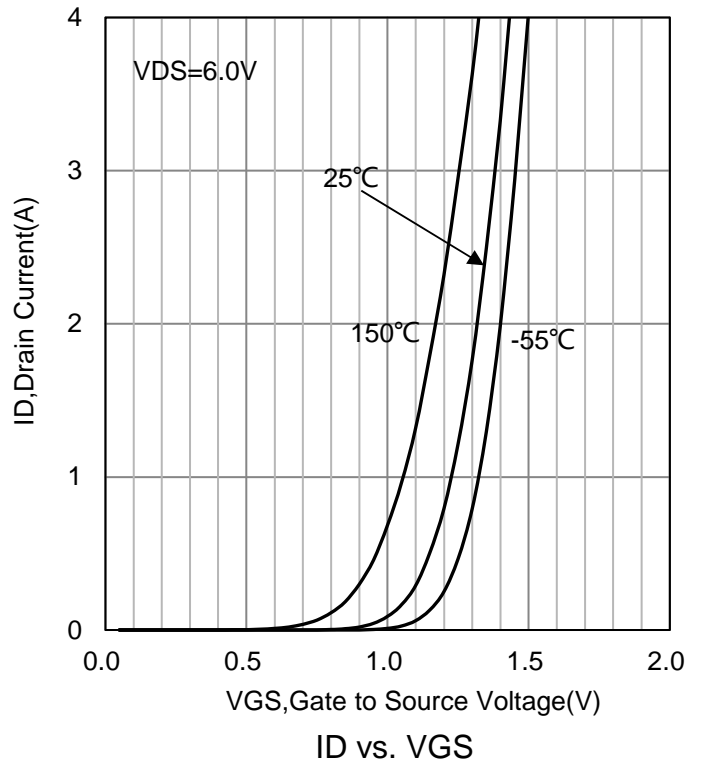
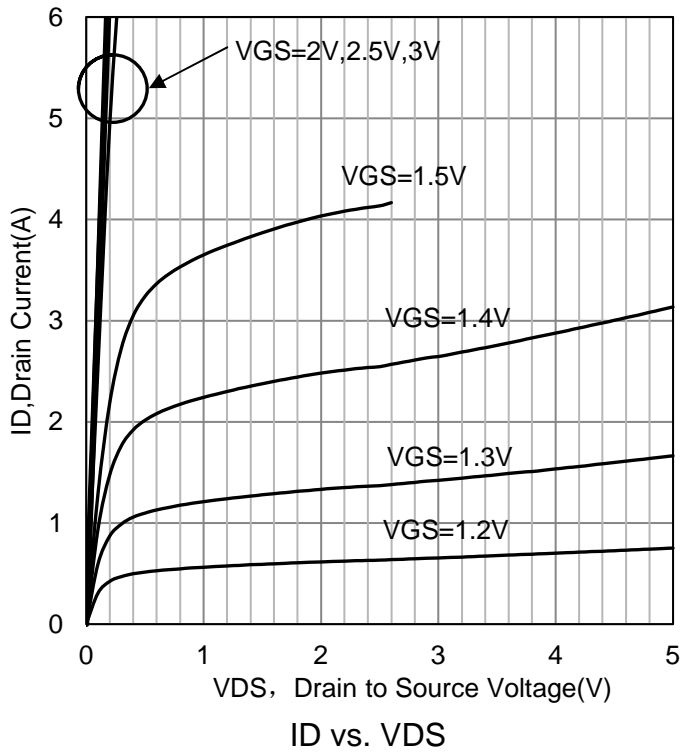
**6. ELECTRICAL CHARACTERISTICS CURVES(Con.)**

P-Channel



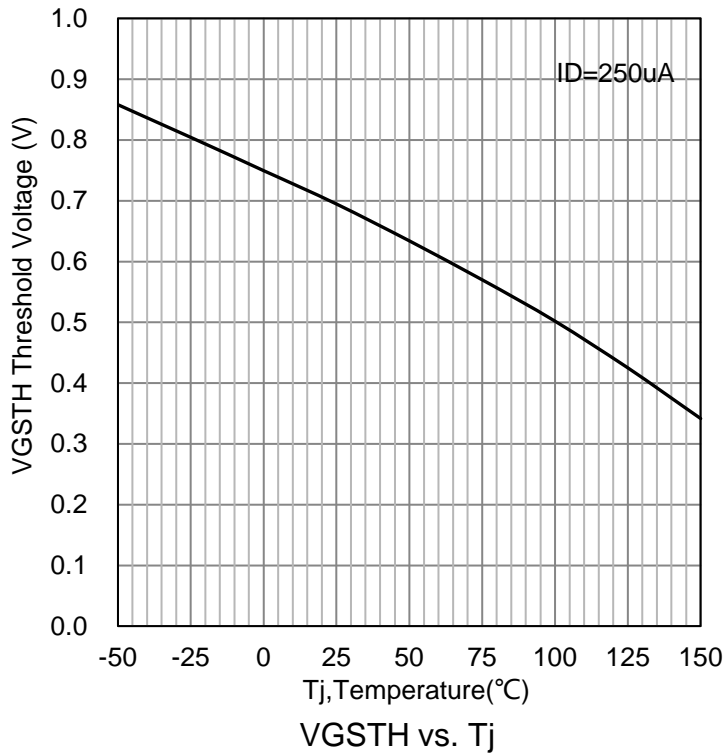
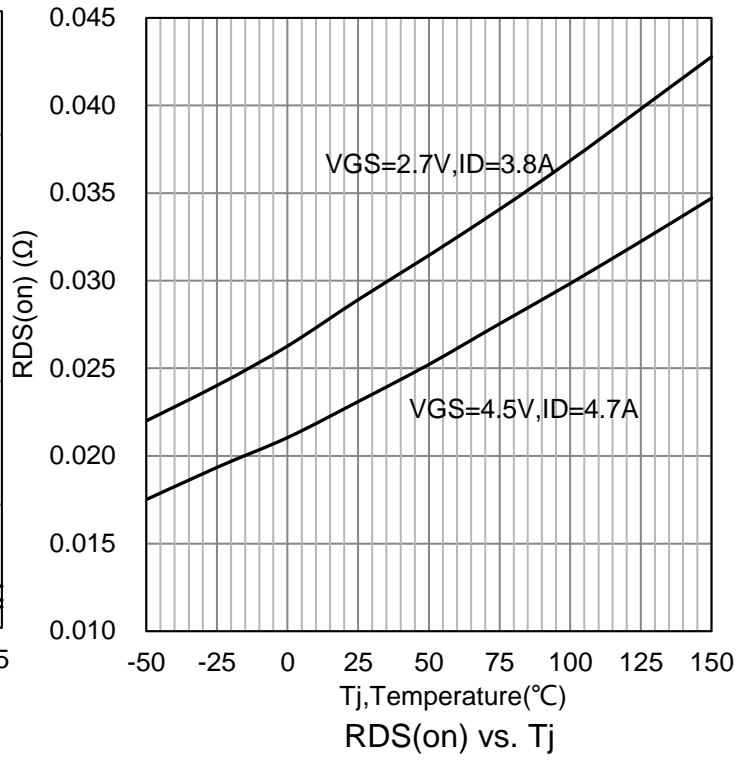
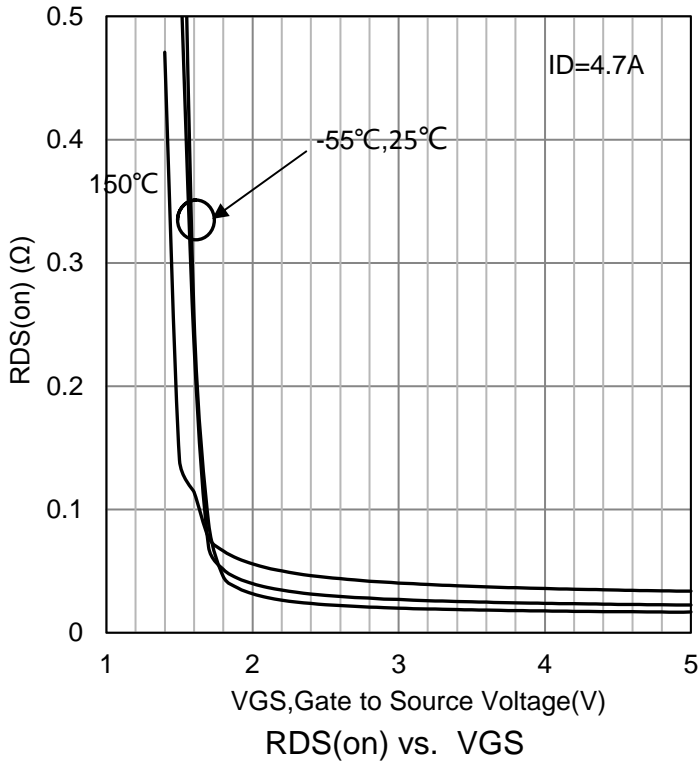
## 6. ELECTRICAL CHARACTERISTICS CURVES

N-Channel



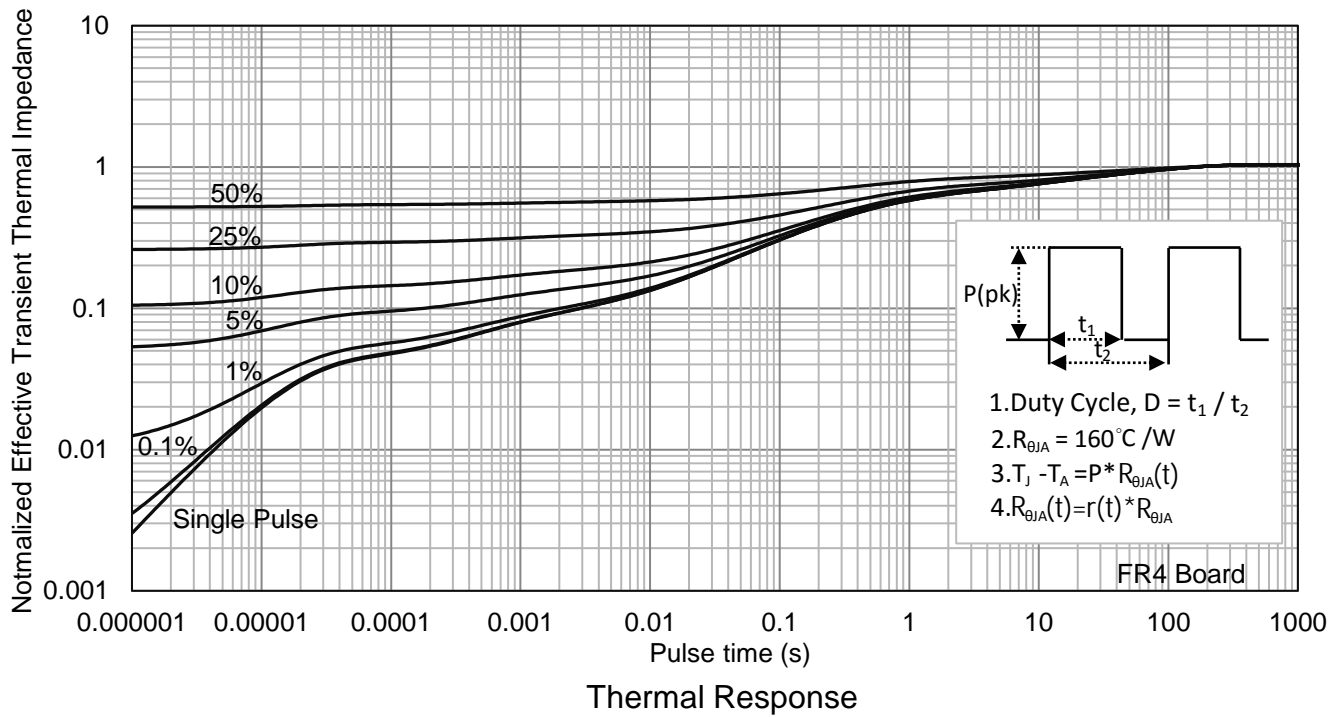
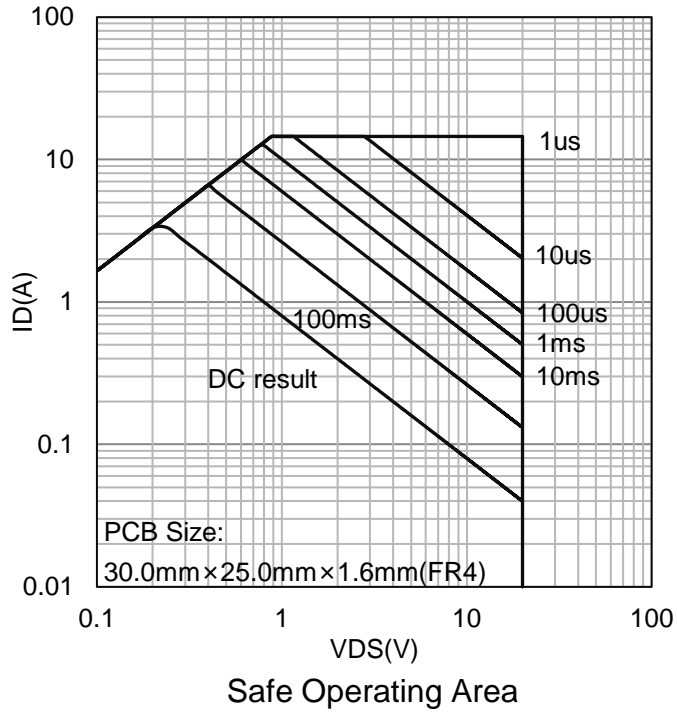
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N-Channel

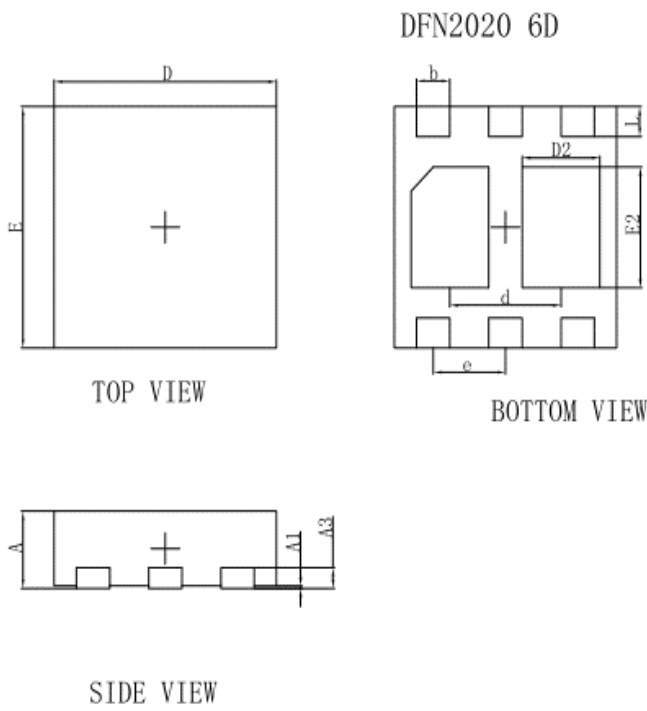


### 6. ELECTRICAL CHARACTERISTICS CURVES(Con.)

N-Channel

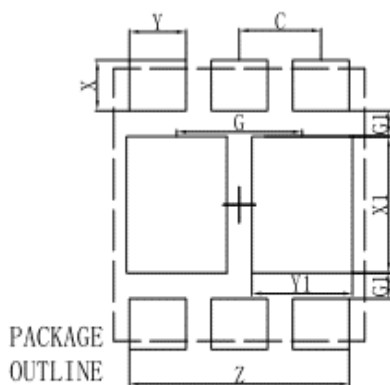


### 7. OUTLINE AND DIMENSIONS



DFN2020-6D			
Dim	Min	Typ	Max
D	1.95	2	2.05
E	1.95	2	2.05
e	-	0.65	-
L	0.20	0.25	0.30
b	0.25	0.3	0.35
d	-	1	-
A	0.60	0.65	0.70
A1	0.00	0.02	0.05
A3	-	0.152	-
E2	0.95	1	1.05
D2	0.65	0.7	0.75
All Dimensions in mm			

### 8. SOLDERING FOOTPRINT



Dimensions	(mm)
X	0.37
Y	0.45
X1	1.00
Y1	0.80
C	0.65
G	1.00
G1	0.19
Z	1.75
C	0.65

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