P-Channel Enhancement Mode MOSFET

TBL200P03DF1

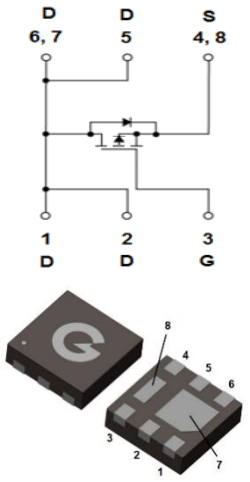
Features

- Advanced trench technology
- Low on-resistance
- Fast switching speed
- HBM: AEC-Q101-001: H1A (JESD22-A114-B: 1A)
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

HF

Mechanical Data

- Case: DFN2020-6L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



DFN2020-6L

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TBL200P03DF1	DFN2020-6L	3000 pcs / Tape & Reel	200P03

Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	-30	V
Gate-to-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current (T_C = 25°C)	I_D	-20	A
Continuous Drain Current (T_A = 25°C) *1		-7.5	A
Continuous Drain Current (T_A = 70°C) *1		-6	A
Pulsed Drain Current (t_p =10μs, T_A = 25°C)	I_{DM}	-30	A
Single Pulse Avalanche Energy *3	E_{AS}	45	mJ
Power Dissipation (T_C = 25°C)	P_D	12.5	W
Power Dissipation (T_A = 25°C) *1		2	W
Operating Junction Temperature Range	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	-	10	°C/W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	60	63	°C/W

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = -250μA	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -30V, V_{GS} = 0V	-	-	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *2	V_{GS} = -10V, I_D = -10A	-	14	20	mΩ
		V_{GS} = -4.5V, I_D = -6A	-	20	32	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-1	-1.7	-2.5	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	9	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = -15V f = 1.0MHz	-	1406	-	pF
C_{OSS}	Output Capacitance		-	157	-	
C_{RSS}	Reverse Transfer Capacitance		-	142	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{DD} = -15V V_{GS} = -10V I_D = -20A R_G = 3Ω	-	12	-	ns
t_r	Turn-on Rise Time *4		-	18	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	90	-	
t_f	Turn-Off Fall Time *4		-	63	-	
Q_G	Total Gate-Charge (V_{GS} = -4.5V)	V_{DD} = -15V V_{GS} = -10V I_D = -10A	-	15	-	nC
	Total Gate-Charge (V_{GS} = -10V)		-	30.5	-	
Q_{GS}	Gate to Source Charge		-	4.6	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	5.7	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_{SD} = -10A, V_{GS} = 0V	-	-0.9	-1.2	V
trr	Reverse Recovery Time	I_{SD} = -10A, V_{GS} = 0V d_I/d_t = 100A/μs	-	92	-	ns
Qrr	Reverse Recovery Charge		-	62	-	nC

Notes:

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 ≤ 300μs, duty cycle ≤ 2%
3. The E_{AS} data shows Max. rating. The test condition is V_{DD} = -20V, V_{GS} = -10V, L = 0.5mH
4. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

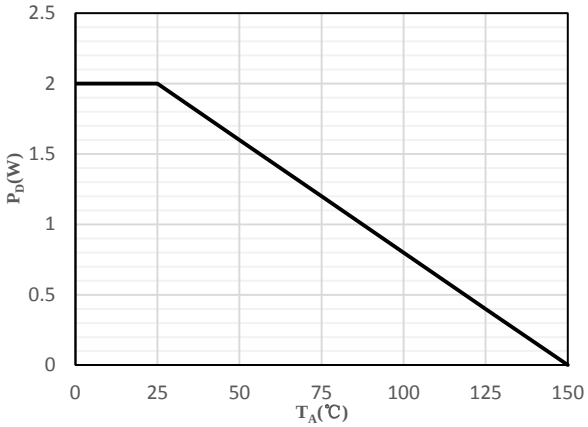


Fig 1 Power Dissipation

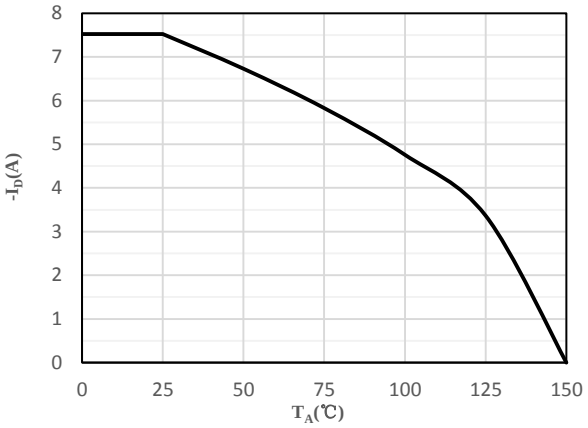


Fig 2 Drain Current

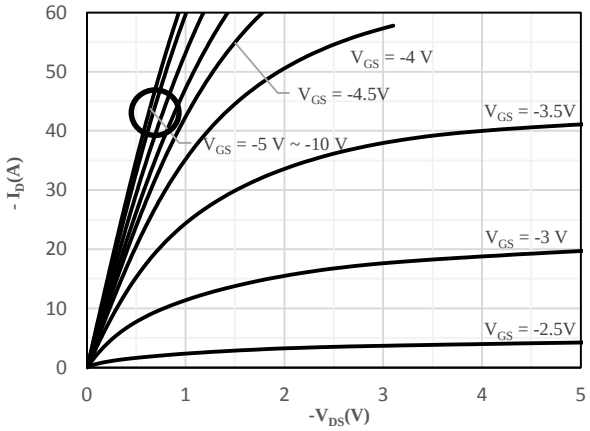


Fig 3 Typical Output Characteristics

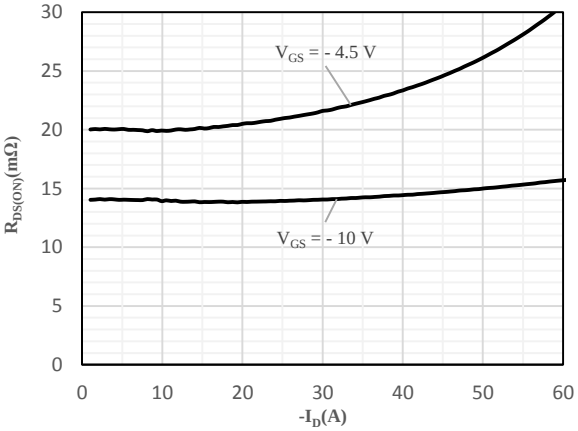


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

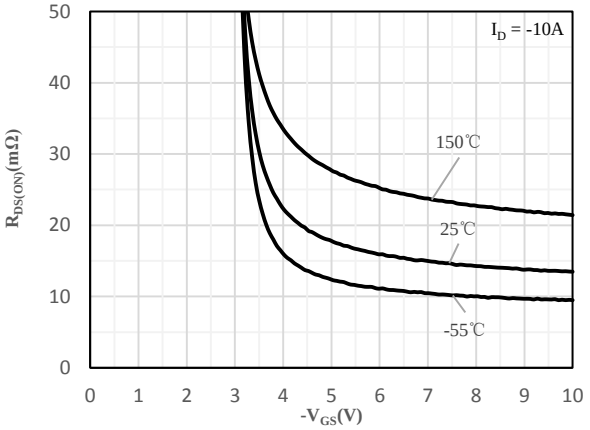


Fig 5 On-Resistance vs. Gate-Source Voltage

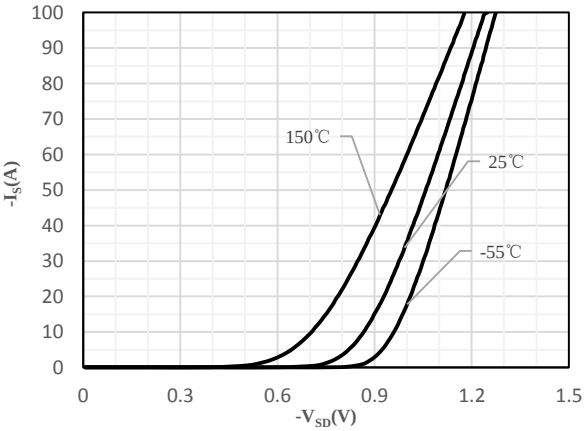


Fig 6 Body-Diode Characteristics

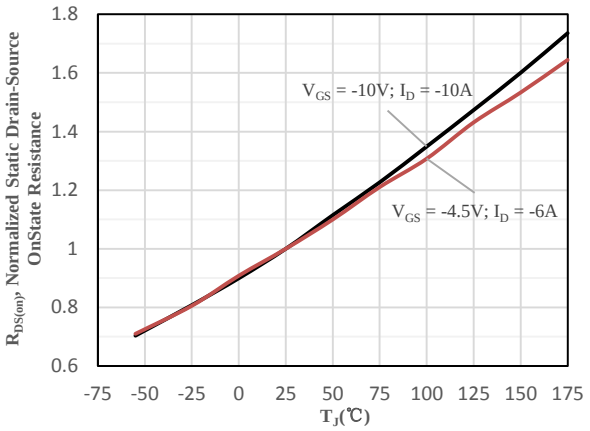


Fig 7 Normalized On-Resistance vs. Junction Temperature

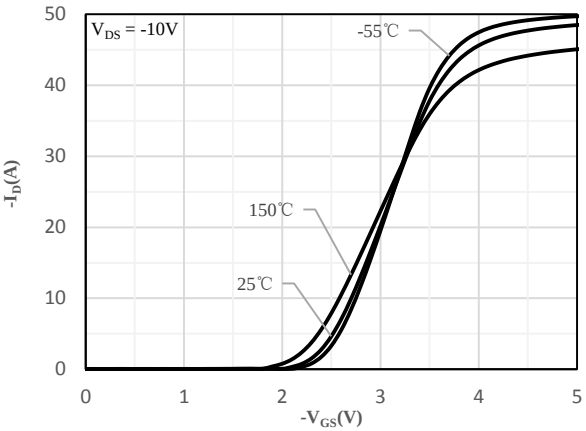


Fig 8 Transfer Characteristics

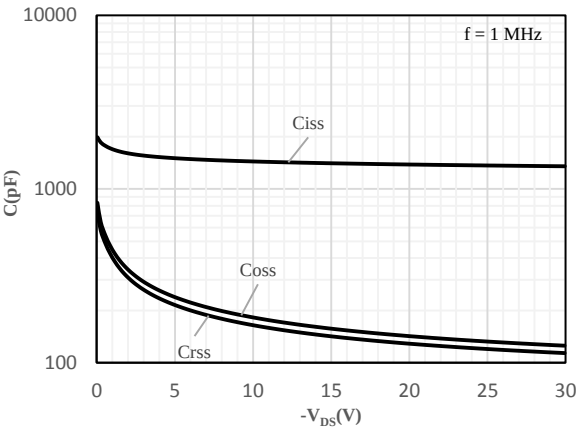


Fig 9 Capacitance Characteristics

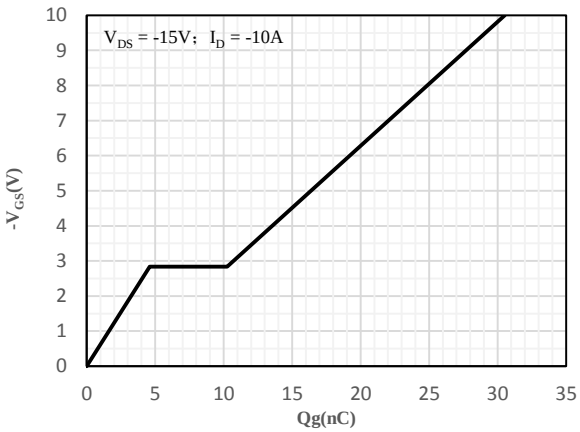


Fig 10 Gate-Charge Characteristics

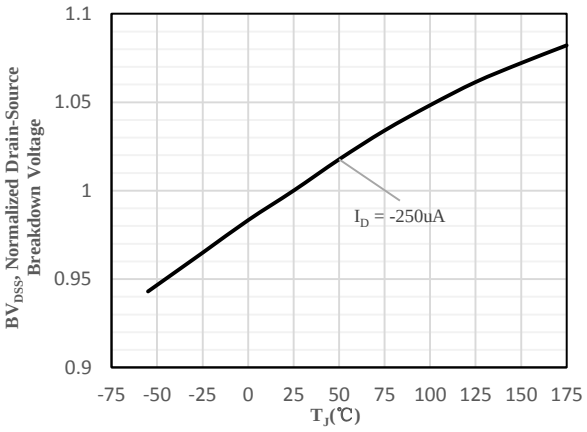


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

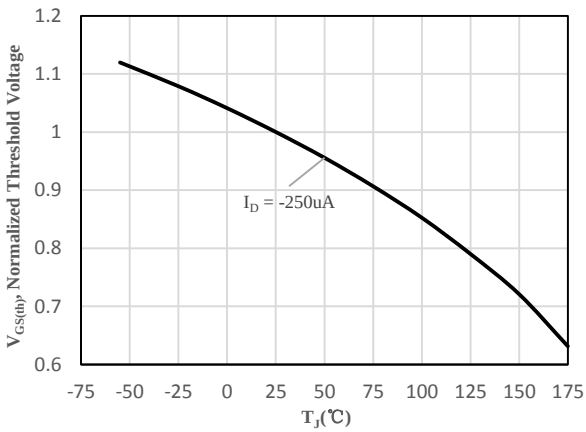


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

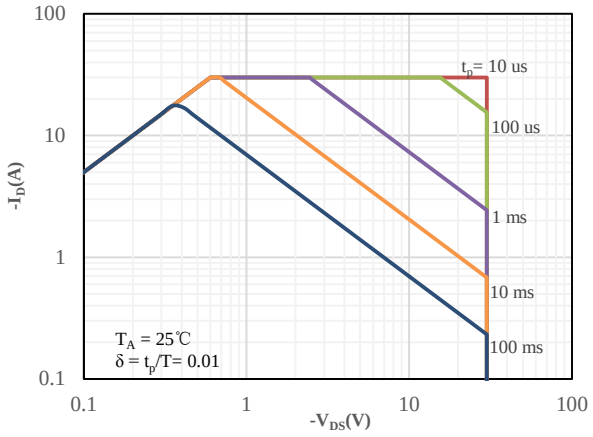


Fig 13 Safe Operating Area

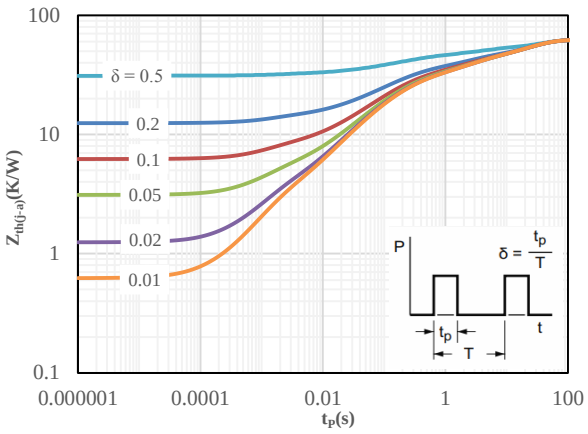
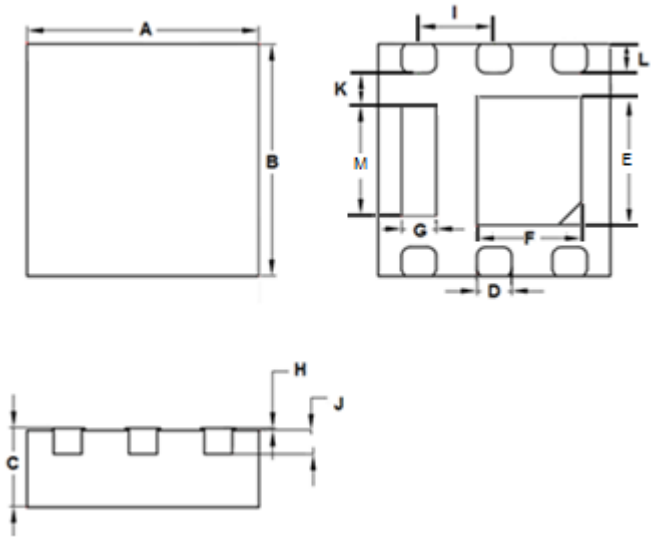


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



DFN2020-6L		
Dimension	**Min.**	**Max.**
A	1.924	2.076
B	1.924	2.076
C	0.500	0.600
D	0.250	0.350
E	0.900	1.100
F	0.850	1.050
G	0.200	0.400
H	0.000	0.050
I	0.550	0.750
J	0.103	0.303
K	0.150	0.350
L	0.200	0.400
M	0.700	0.900

Mounting Pad Layout (Unit: mm)

DFN2020-6L

