

P-Channel Enhancement Mode Power MOSFET

Description

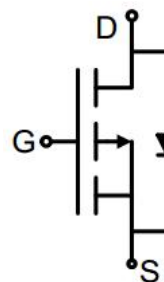
The G020P04TL uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

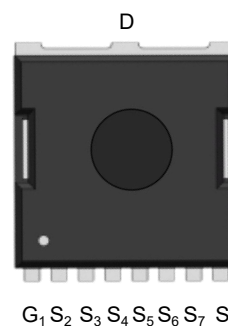
- V_{DS} -40V
- I_D (at $V_{GS} = -10V$) -380A
- $R_{DS(ON)}$ (at $V_{GS} = -10V$) < 1.5m Ω
- $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) < 2.1m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TOLL-8L

Ordering Information

Device	Package	Marking	Packaging
G020P04TL	TOLL	G020P04	2000pcs/Reel

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-40	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	-380	A
	$T_C = 100^\circ\text{C}$	-240	
Pulsed Drain Current (note1)	I_{DM}	-1520	A
Gate-Source Voltage	V_{GS}	± 20	V
Power Dissipation	P_D	370	W
Single pulse avalanche energy (note2)	E_{AS}	1225	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	50	$^\circ\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	0.34	$^\circ\text{C/W}$

Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-40	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -40V, V _{GS} = 0V	--	--	-1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-1.6	-2.5	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -80A	--	1.3	1.5	mΩ
		V _{GS} = -4.5V, I _D = -80A	--	1.8	2.1	
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _D = -80A	--	92	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -20V, f = 1MHz	--	24000	--	pF
Output Capacitance	C _{oss}		--	12500	--	
Reverse Transfer Capacitance	C _{rss}		--	2800	--	
Total Gate Charge	Q _g	V _{DD} = -20V, I _D = -80A, V _{GS} = -10V	--	824	--	nC
Gate-Source Charge	Q _{gs}		--	164	--	
Gate-Drain Charge	Q _{gd}		--	104	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = -20V, I _D = -80A, R _G = 1.6Ω	--	176	--	ns
Turn-on Rise Time	t _r		--	196	--	
Turn-off Delay Time	t _{d(off)}		--	552	--	
Turn-off Fall Time	t _f		--	176	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-380	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -80A, V _{GS} = 0V	--	--	-1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = -80A, V _{GS} = 0V di/dt=-100A/us	--	792	--	nC
Reverse Recovery Time	T _{rr}		--	308	--	ns

Notes

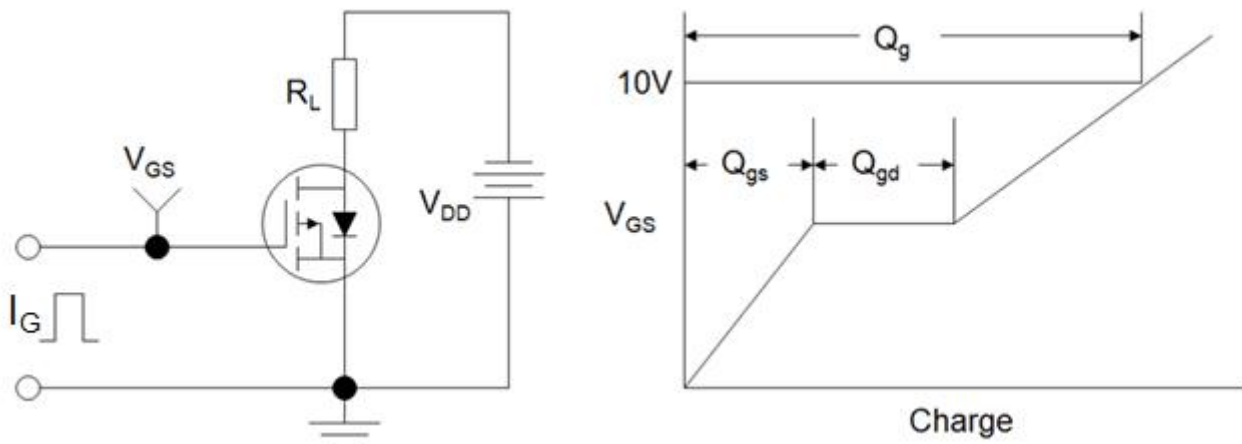
1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition : $T_J = 25^\circ\text{C}, V_{DD} = -40V, V_{GS} = -10V, L = 0.5mH, R_g = 25\Omega$

The table shows the minimum avalanche energy, which is 3364mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

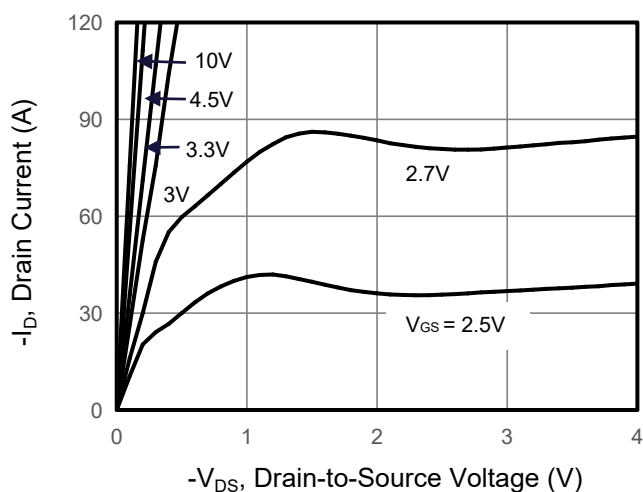


Figure 2. Transfer Characteristics

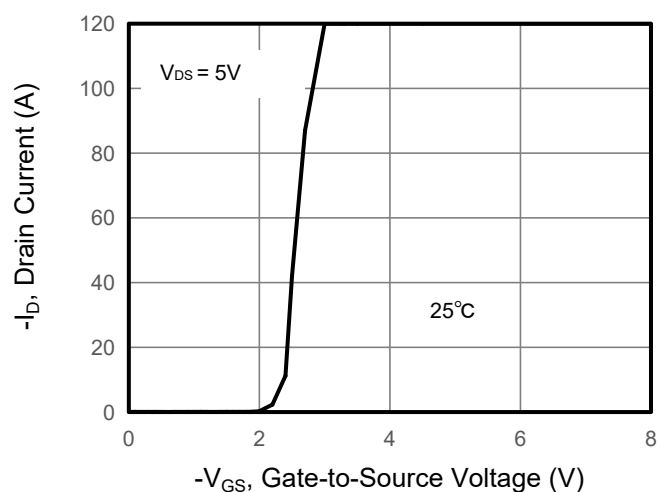


Figure 3. Drain Source On Resistance

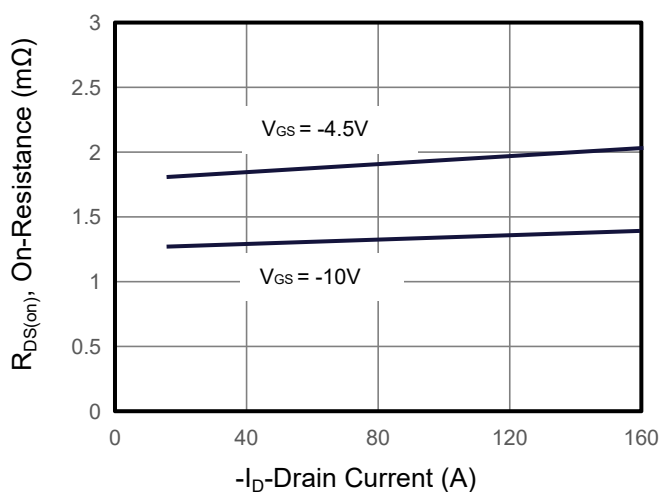


Figure 4. Gate Charge

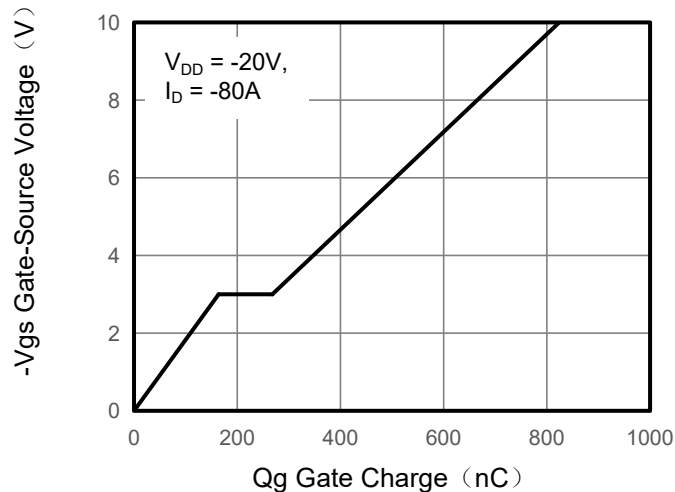


Figure 5. Capacitance

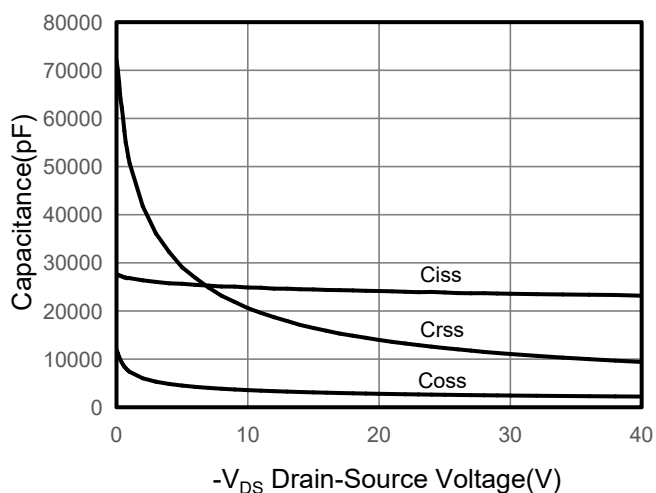
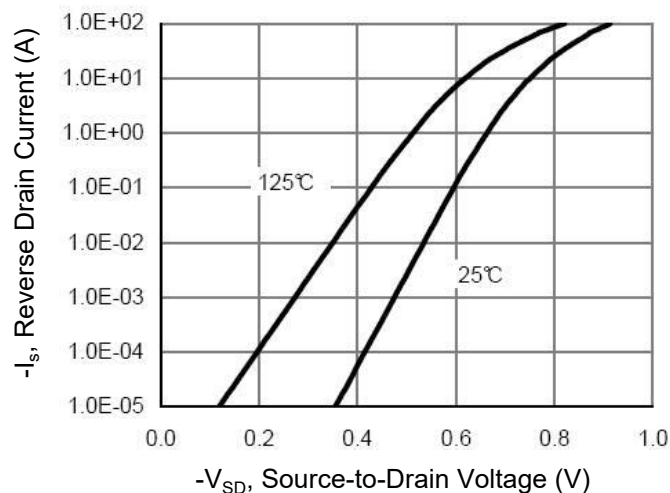


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

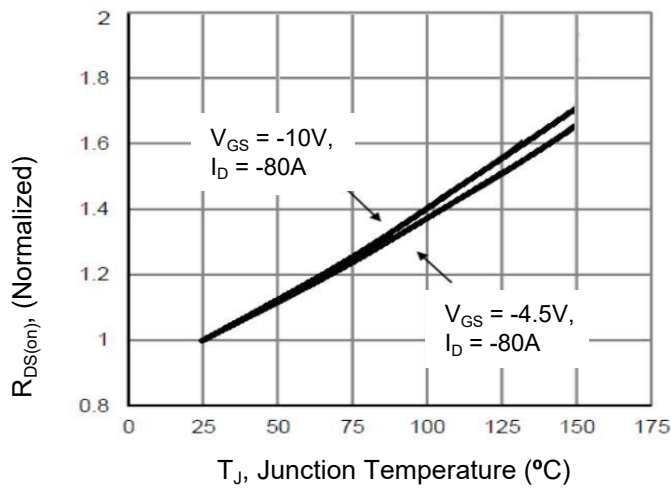


Figure 8. Safe Operation Area

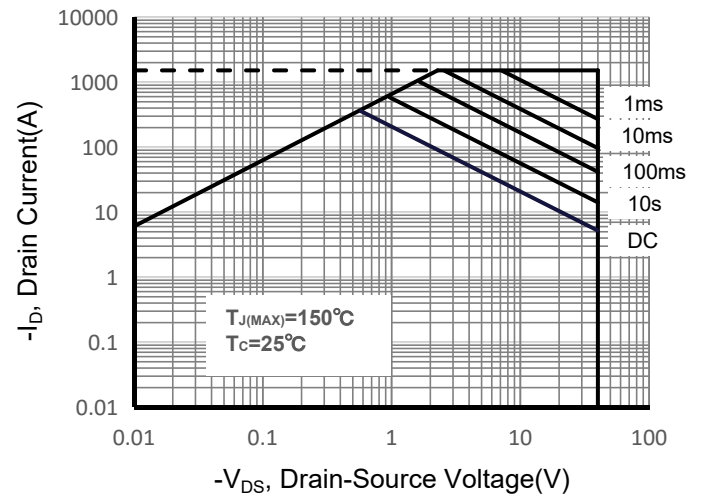


Figure 9. Maximum Continuous Drain Current vs Case Temperature

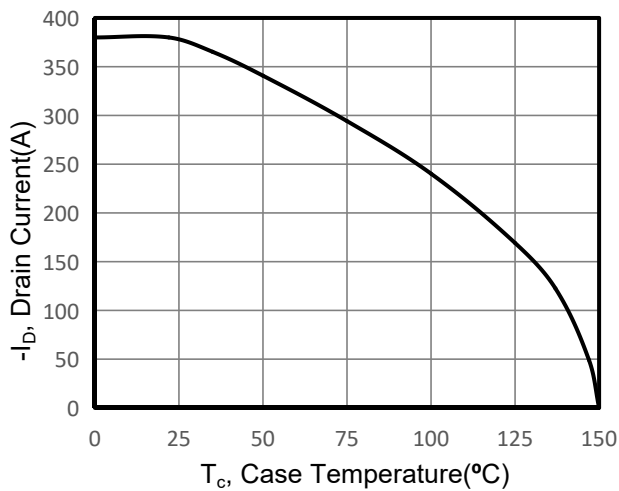
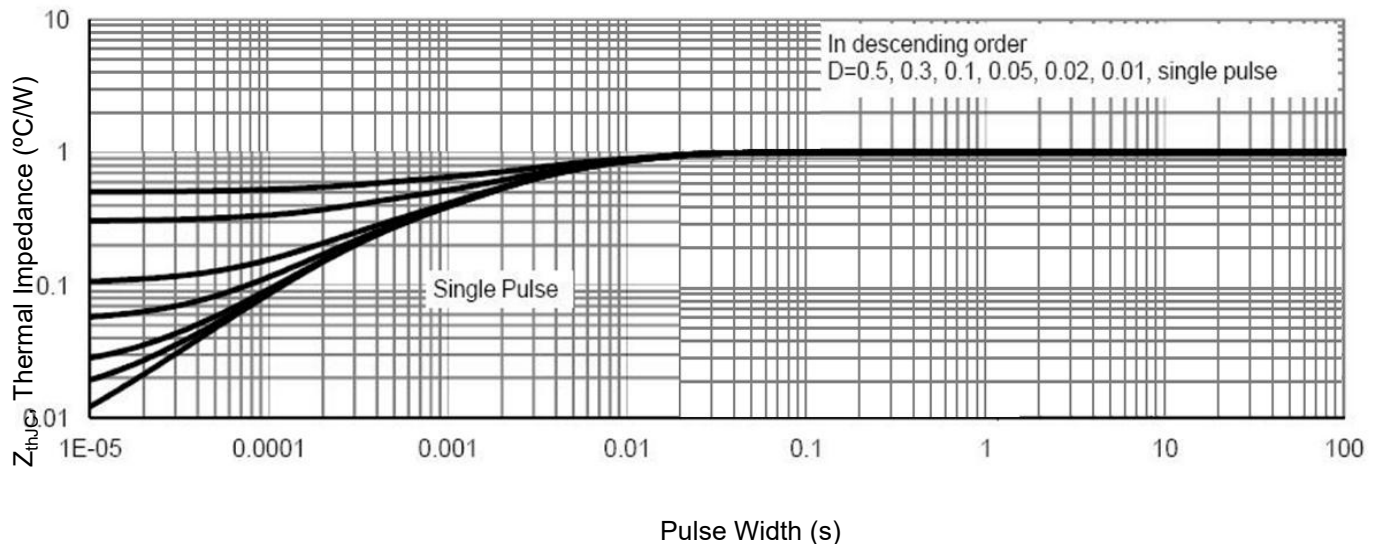
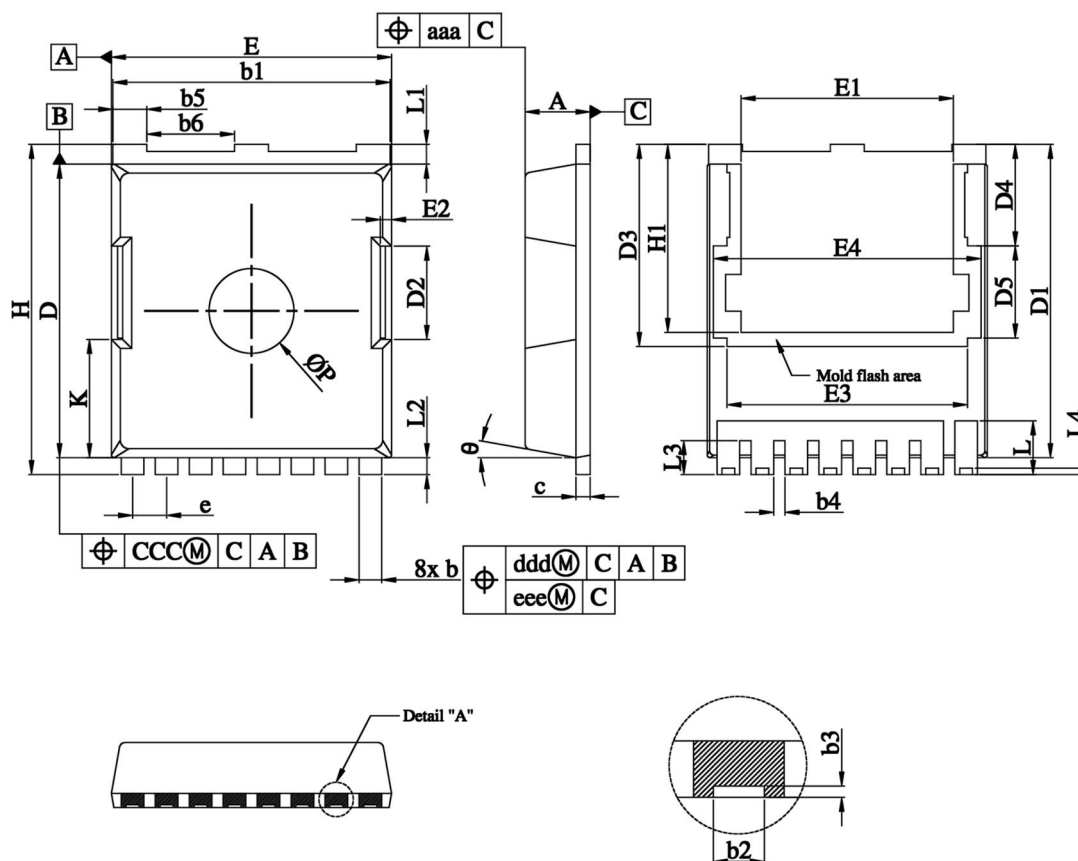


Figure 10. Normalized Maximum Transient Thermal Impedance



TOLL-8L Package Information



SYMBOL	COMMON			SYMBOL	COMMON		
	MILLIMETER				MILLIMETER		
	MIN.	NOMINAL	MAX.		MIN.	NOMINAL	MAX.
A	2.20	2.30	2.40	E2	0.30	0.40	0.50
b	0.70	0.80	0.90	E3	8.50		
b1	9.70	9.80	9.90	E4	9.46		
b2	0.36	0.45	0.55	H	11.50	11.68	11.85
b3	0.05	0.100	/	H1	6.55	6.65	6.75
b4	0.30	0.40	0.50	K	4.08	4.18	4.28
b5	1.10	1.20	1.30	L	1.60	1.90	2.10
b6	3.00	3.10	3.20	L1	0.50	0.70	0.90
c	0.40	0.50	0.60	L2	0.50	0.60	0.70
D	10.28	10.38	10.55	L3	1.00	1.20	1.30
D1	10.98	11.08	11.18	L4	0.13	0.23	0.33
D2	3.20	3.30	3.40	P	2.85	3.00	3.15
D3	7.15			θ	10° REF		
D4	3.59			aaa	0.20		
D5	3.26			ccc	0.20		
e	1.10	1.20	1.30	ddd	0.25		
E	9.80	9.90	10.00	eee	0.20		
E1	7.40	7.50	7.60				