

P-Channel Enhancement Mode Power MOSFET

Description

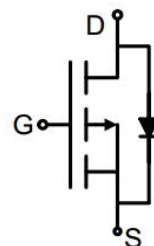
The G030P04T uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

- V_{DS} -40V
- I_D (at $V_{GS} = -10V$) -185A
- $R_{DS(ON)}$ (at $V_{GS} = -10V$) < 3m Ω
- $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) < 3.8m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-220

Ordering Information

Device	Package	Marking	Packaging
G030P04T	TO-220	G030P04	50pcs/Tube

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	$T_C = 25^\circ\text{C}$	-185	A
	$T_C = 100^\circ\text{C}$	-117	
Pulsed Drain Current (note1)	I_{DM}	-740	A
Gate-Source Voltage	V_{GS}	± 20	V
Power Dissipation	P_D	183	W
Single pulse avalanche energy (note2)	E_{AS}	840	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}	0.68	$^\circ\text{C/W}$

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 = -20A	--	2.6	3.0	mΩ
		V _{GS} = -4.5V, I _D = -20A	--	3.2	3.8	
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _D = -20A	--	83	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -20V, f = 1.0MHz	--	12200	--	pF
Output Capacitance	C _{oss}		--	1800	--	
Reverse Transfer Capacitance	C _{rss}		--	1400	--	
Total Gate Charge	Q _g	V _{DD} = -20V, I _D = -20A, V _{GS} = -10V	--	206	--	nC
Gate-Source Charge	Q _{gs}		--	41	--	
Gate-Drain Charge	Q _{gd}		--	26	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = -20V, I _D = -20A, R _G = 1.6Ω	--	44	--	ns
Turn-on Rise Time	t _r		--	49	--	
Turn-off Delay Time	t _{d(off)}		--	138	--	
Turn-off Fall Time	t _f		--	44	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-185	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -20A, V _{GS} = 0V	--	--	-1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = -20A, V _{GS} = 0V di/dt=-100A/us	--	198	--	nC
Reverse Recovery Time	T _{rr}		--	77	--	ns

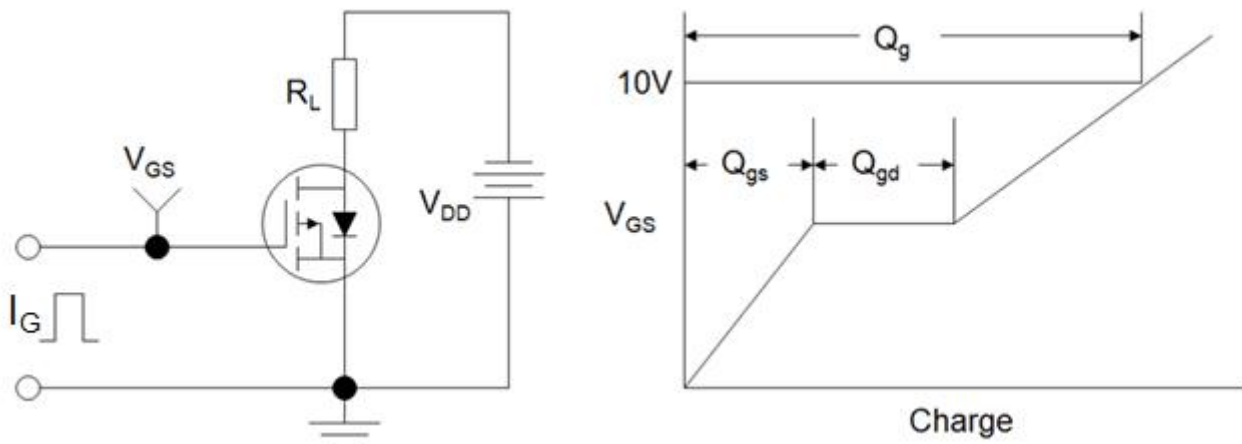
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : $T_J = 25^{\circ}\text{C}, V_{DD} = -40V, V_{GS} = -10V, L = 0.5\text{mH}, R_G = 25\Omega$

The table shows the minimum avalanche energy, which is 2300mJ 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

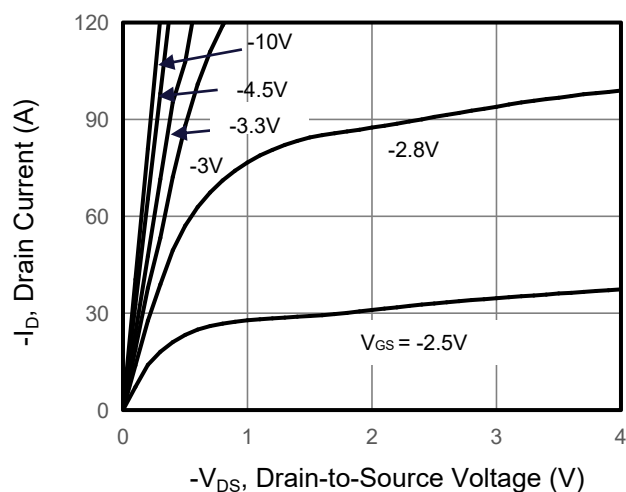


Figure 2. Transfer Characteristics

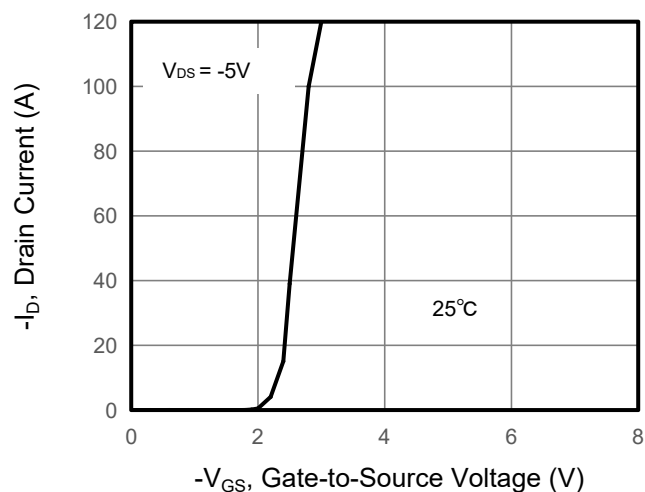


Figure 3. Drain Source On Resistance

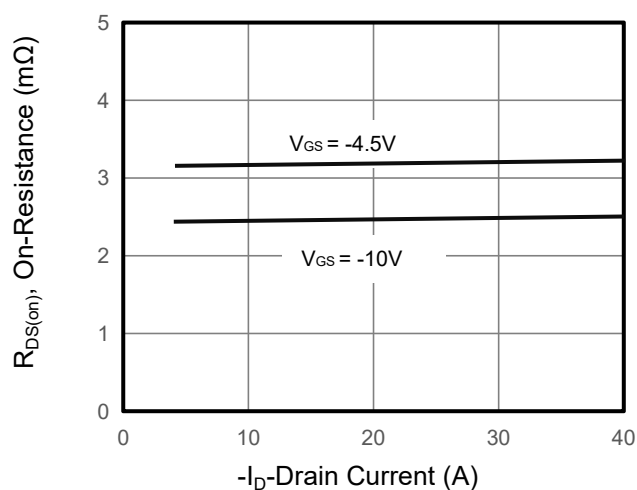


Figure 4. Gate Charge

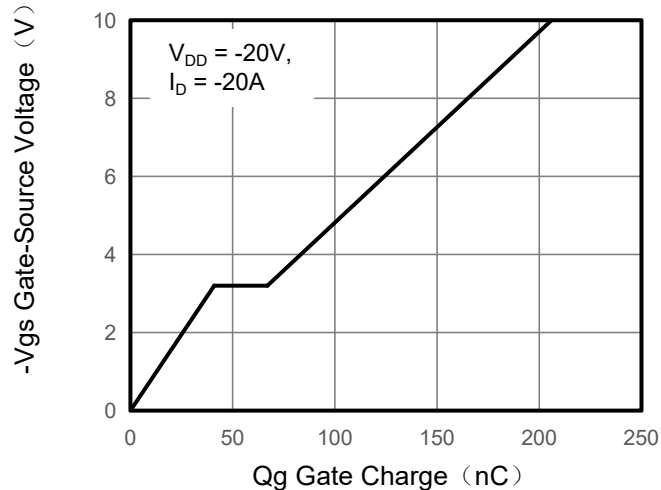


Figure 5. Capacitance

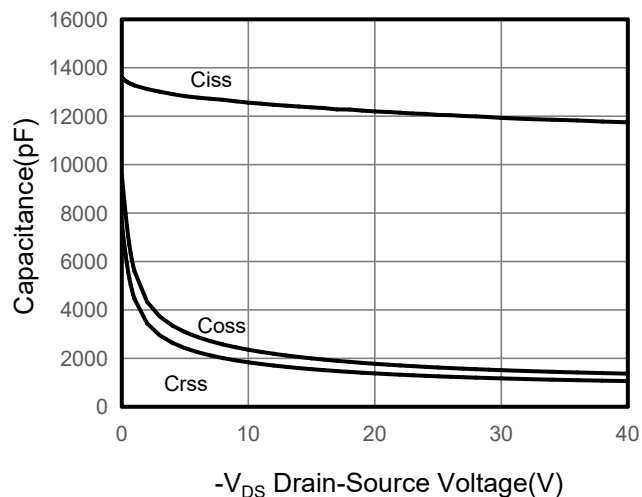
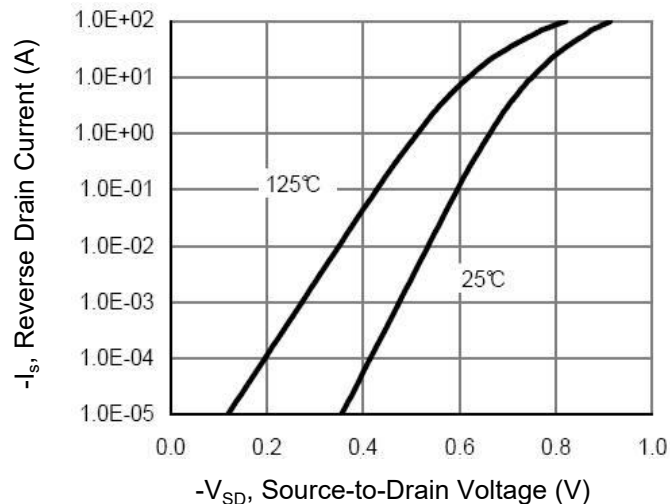


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

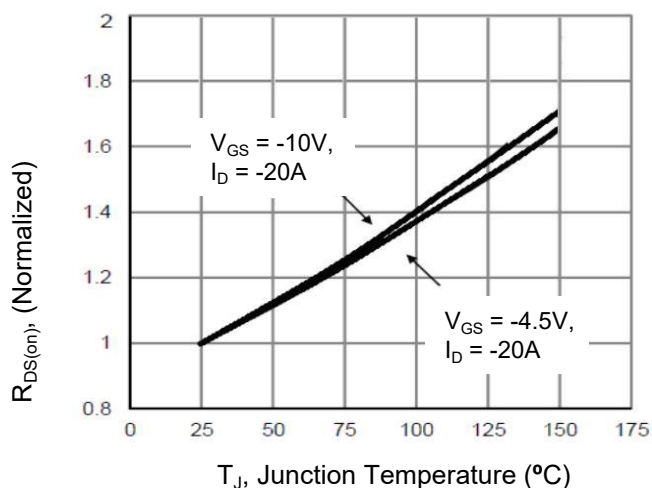


Figure 8. Safe Operation Area

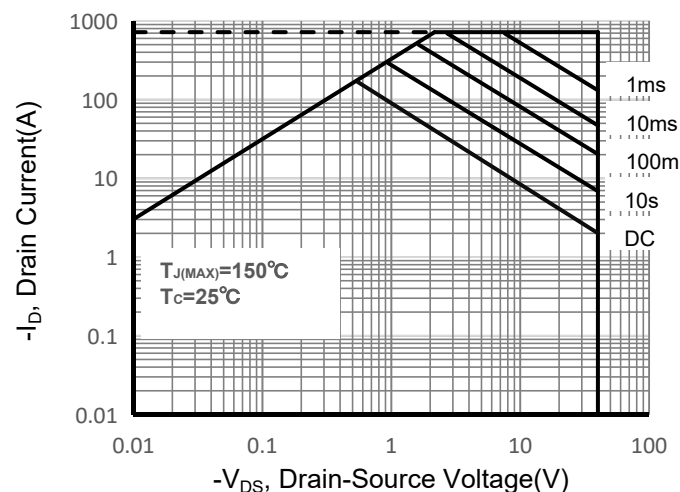


Figure 9. Maximum Continuous Drain Current vs Case Temperature

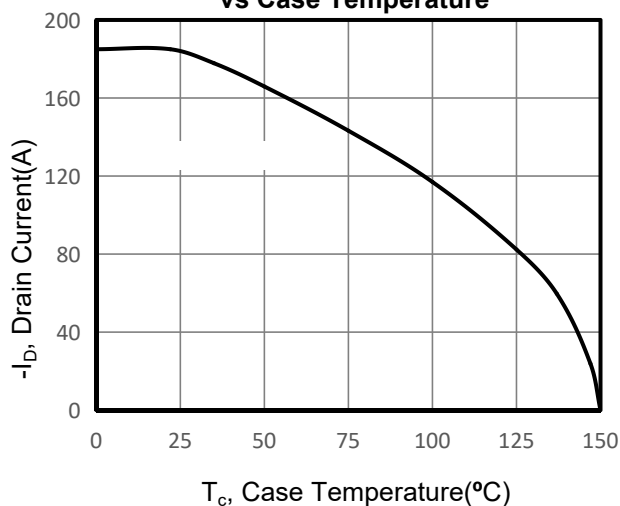
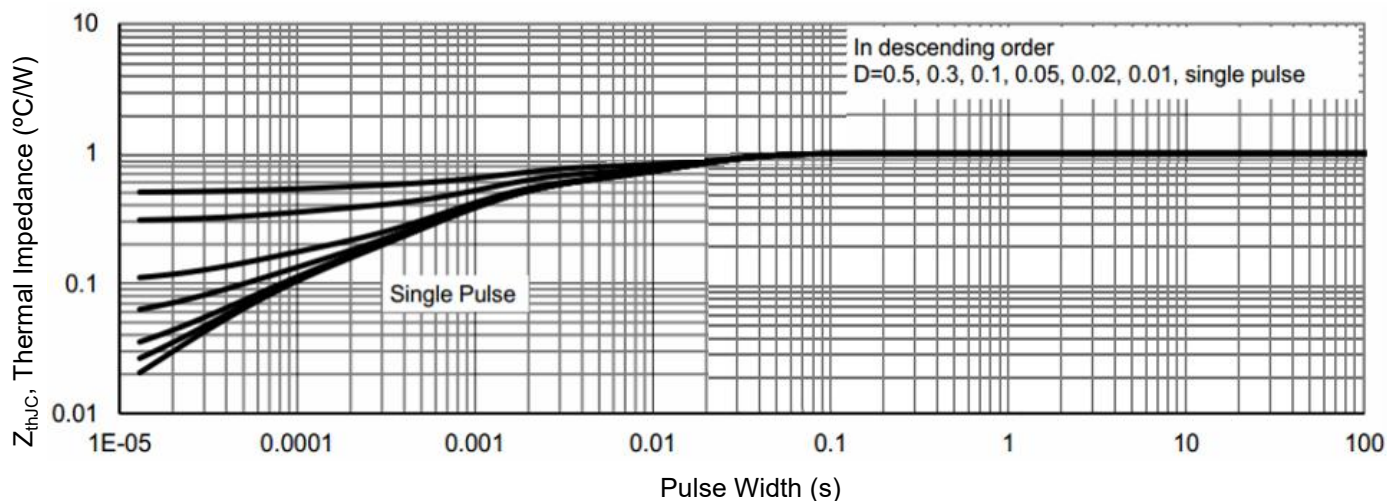
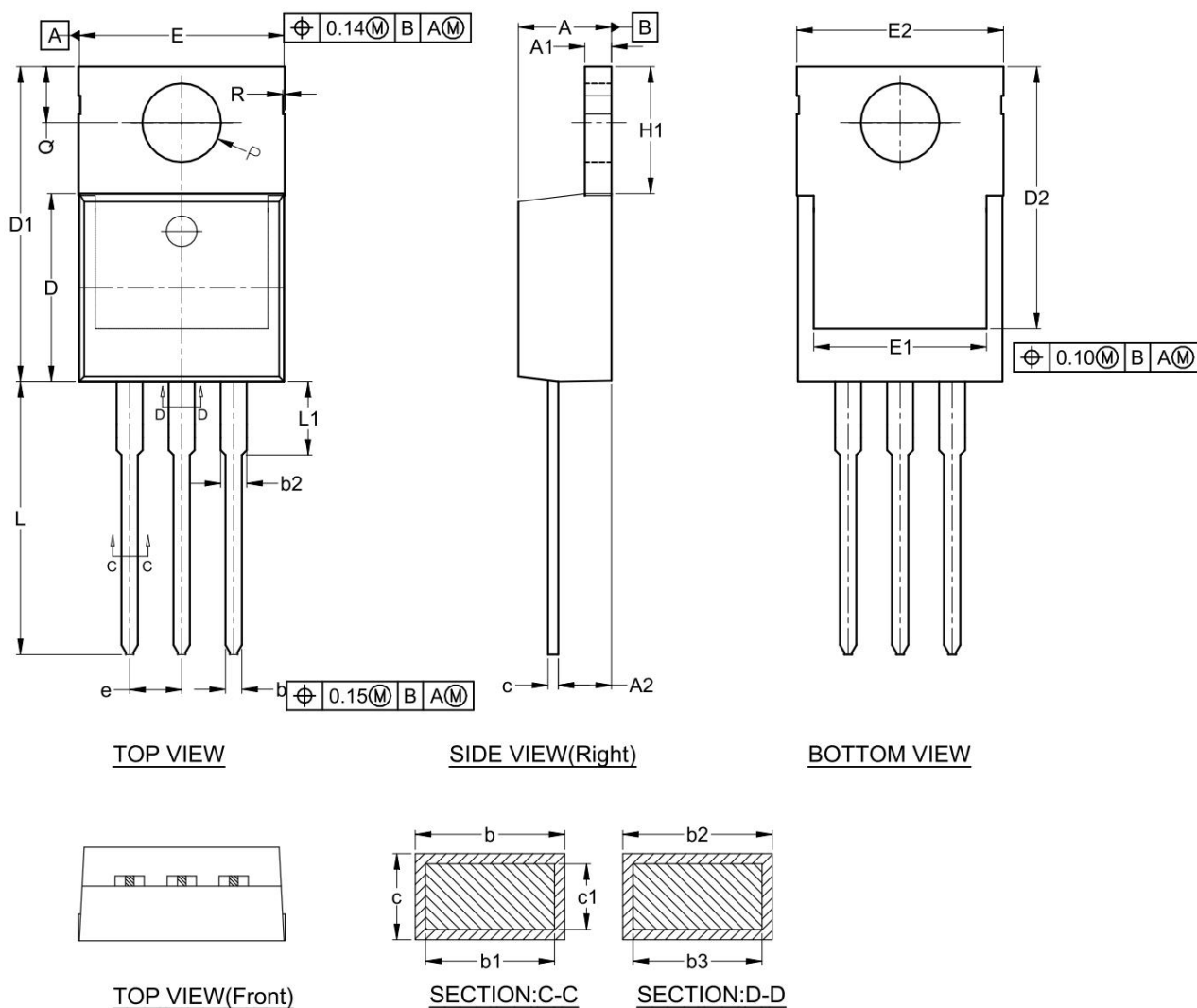


Figure 10. Normalized Maximum Transient Thermal Impedance



TO-220 Package Information



DIM SYMBOL	MIN.	NOM.	MAX.	DIM SYMBOL	MIN.	NOM.	MAX.
A	4.450	4.550	4.650	D2	12.610	12.810	13.010
A1	1.240	1.340	1.440	E	9.900	10.000	10.100
A2	2.500	2.600	2.700	E1	8.240	8.440	8.640
b	0.740	0.840	0.940	E2	9.900	10.100	10.300
b1	0.700	0.800	0.900	e	2.540 BSC.		
b2	1.210	1.310	1.410	H1	6.000	6.200	6.400
b3	1.170	1.270	1.370	L	13.140	13.340	13.540
c	0.440	0.540	0.640	L1	3.385	3.585	3.785
c1	0.400	0.500	0.600	ØP	3.740	3.840	3.940
D	9.100	9.200	9.300	Q	2.600	2.740	2.940
D1	15.200	15.400	15.600	R	0.108 REF.		