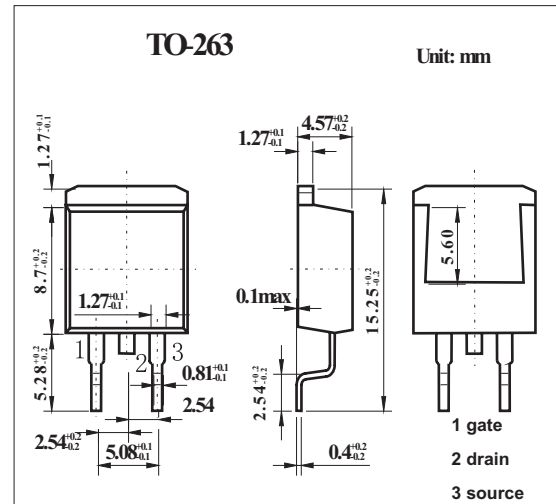
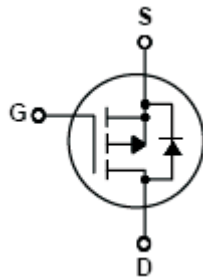


## 400V P-Channel MOSFET

## KQB4P40

## ■ Features

- 3.5A, -400V,  $R_{DS(on)} = 3.1 \Omega$  @  $V_{GS} = -10$  V
- Low gate charge ( typical 18 nC)
- Low  $C_{rss}$  ( typical 11 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

■ Absolute Maximum Ratings  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Rating	Unit
Drain to Source Voltage	$V_{DSS}$	-400	V
Drain Current Continuous $T_c=25^\circ\text{C}$	$I_D$	-3.5	A
Drain Current Continuous $T_c=100^\circ\text{C}$		-2.2	A
Drain Current - Pulsed (Note 1)	$I_{DM}$	-14	A
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Single Pulsed Avalanche Energy (Note 2)	$E_{AS}$	260	mJ
Avalanche Current (Note 1)	$I_{AR}$	-3.5	A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	8.5	mJ
Peak Diode Recovery dv/dt (Note 3)	dv/dt	-4.5	V/ns
Power dissipation @ $T_a=25^\circ\text{C}$	$P_D$	3.13	W
Power dissipation @ $T_c=25^\circ\text{C}$		85	W
Derate above $25^\circ\text{C}$		0.68	W/ $^\circ\text{C}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	$T_L$	300	$^\circ\text{C}$
Thermal Resistance Junction to Case	$R_{\theta JC}$	1.47	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Ambient *	$R_{\theta JA}$	40	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$

\* When mounted on the minimum pad size recommended (PCB Mount)

## KQB4P40

## ■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	B <sub>VDS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-400			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta B_{VDS}}{\Delta T_J}$	I <sub>D</sub> = -250 μA, Referenced to 25°C		0.36		V/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -400 V, V <sub>GS</sub> = 0 V			-1	μA
		V <sub>DS</sub> = -320V, T <sub>C</sub> =125°C			-10	μA
Gate-Body Leakage, Forward	I <sub>GSSF</sub>	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V			-100	nA
Gate-Body Leakage, Reverse	I <sub>GSSR</sub>	V <sub>GS</sub> = 30V, V <sub>DS</sub> = 0 V			100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-3.0		-5.0	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -1.75A		2.44	3.1	Ω
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -50 V, I <sub>D</sub> = -1.75 A		2.7		S
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz		520	680	pF
Output Capacitance	C <sub>oss</sub>			80	105	pF
Reverse Transfer Capacitance	C <sub>rss</sub>			11	15	pF
Turn-On Delay Time	t <sub>d(on)</sub>			13	35	ns
Turn-On Rise Time	t <sub>r</sub>	V <sub>DD</sub> = -200 V, I <sub>D</sub> = -3.5 A, R <sub>G</sub> = 25 Ω (Note4,5)		55	120	ns
Turn-Off Delay Time	t <sub>d(off)</sub>			35	80	ns
Turn-Off Fall Time	t <sub>f</sub>			37	85	ns
Total Gate Charge	Q <sub>g</sub>			18	23	nC
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = -320 V, I <sub>D</sub> = -3.5 A, V <sub>GS</sub> = -10 V (Note4,5)		5.8		nC
Gate-Drain Charge	Q <sub>gd</sub>			9.4		nC
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				-3.5	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				-14	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -3.5 A			-5	V
Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -3.5 A,		260		ns
Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>F</sub> / dt = 100 A/μs (Note 4)		1.4		μC

Note:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 37mH, I<sub>AS</sub> = -3.5A, V<sub>DD</sub> = -50V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C
3. I<sub>SD</sub> ≤ -3.5A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ B<sub>VDS</sub>, Starting T<sub>J</sub> = 25°C
4. Pulse Test : Pulse width ≤ 300 μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature