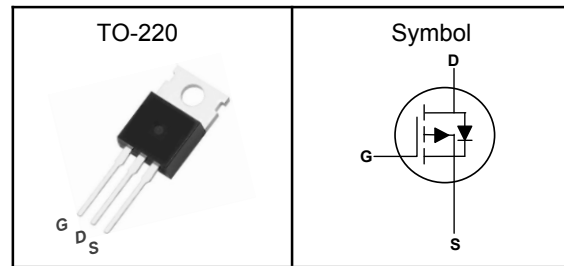


**P-Channel Enhancement Mode MOSFET**
**Features**

- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic
- 100% UIS and Rg Tested

**Applications**

- Motor drivers
- DC - DC Converter

**Pin Description**


$V_{DSS}$	-80	V
$R_{DS(ON)-Typ}$	13	m $\Omega$
$I_D$	-78	A

**Absolute Maximum Ratings** ( $T_J=25^\circ\text{C}$ , Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit
$V_{DSS}$	Drain-Source Voltage	-80	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$T_J$	Maximum Junction Temperature	-55 to 150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$I_{DM}^{①}$	Pulse Drain Current Tested	-312	A
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$ -78	A
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 178	W
$E_{AS}^{②}$	Avalanche Energy, Single pulse	$L=0.5\text{mH}$ 272	mJ

**Thermal Characteristics**

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.8	$^\circ\text{C/W}$

Note ① : Max. current is limited by bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature  $150^\circ\text{C}$ .

Note ③ : Surface Mounted on  $1\text{in}^2$  FR-4 board with 1oz.



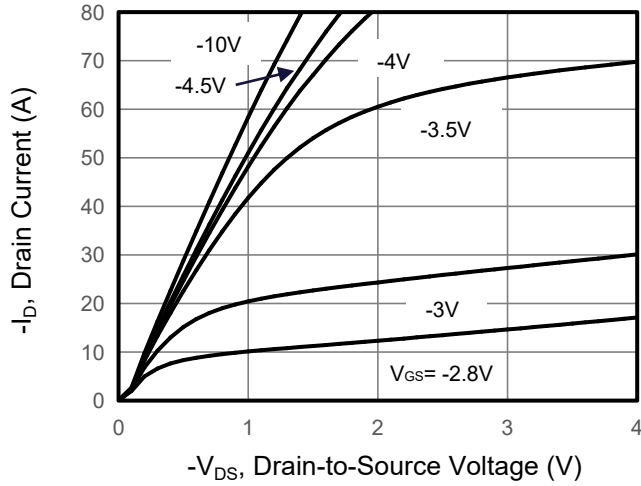
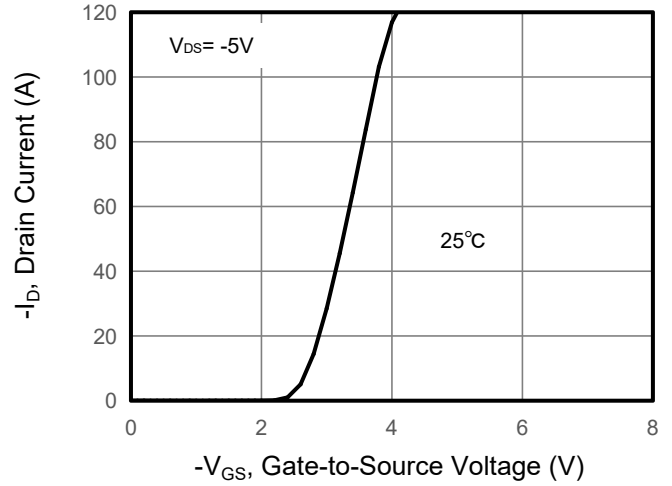
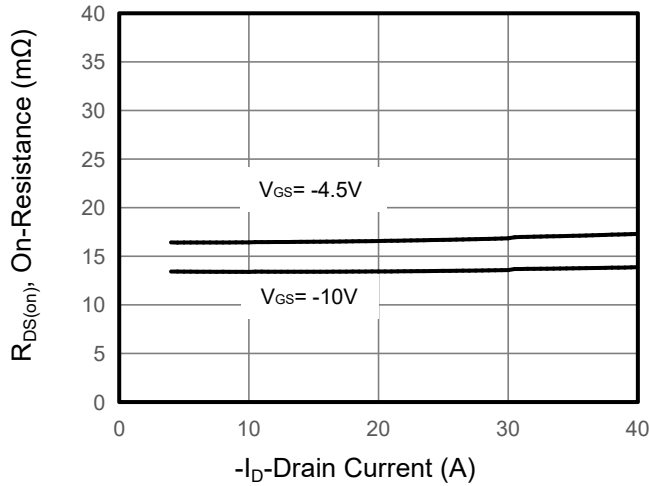
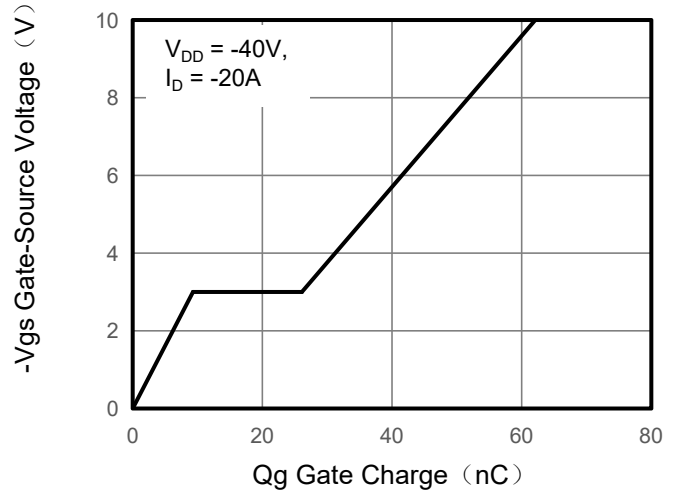
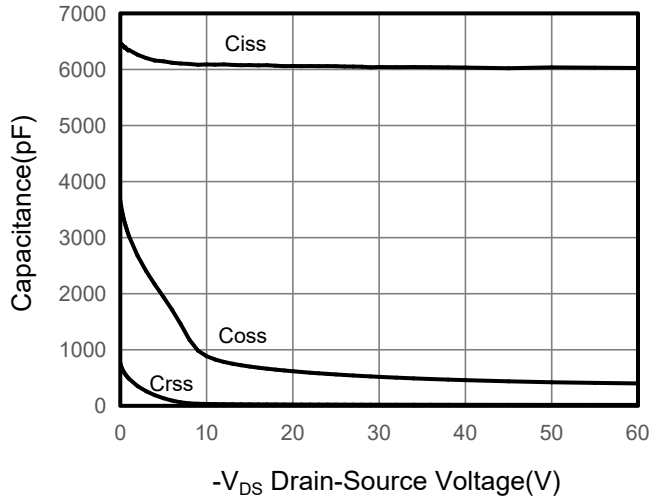
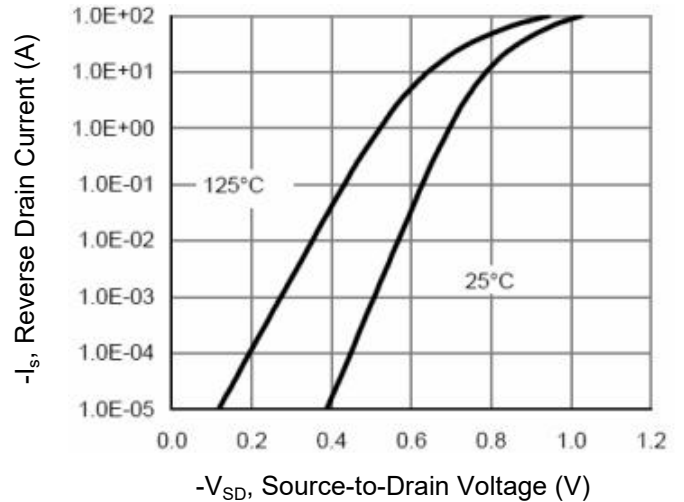
**P-Channel Enhancement Mode MOSFET**

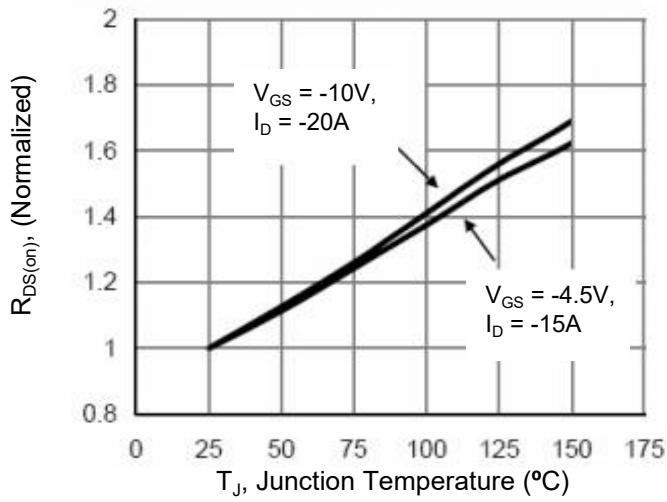
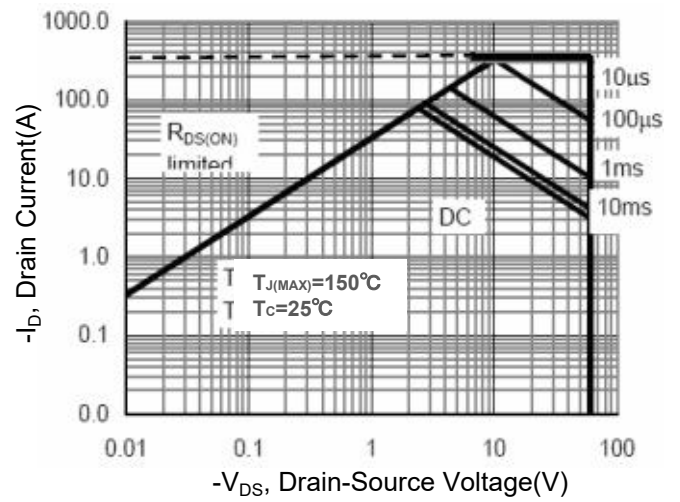
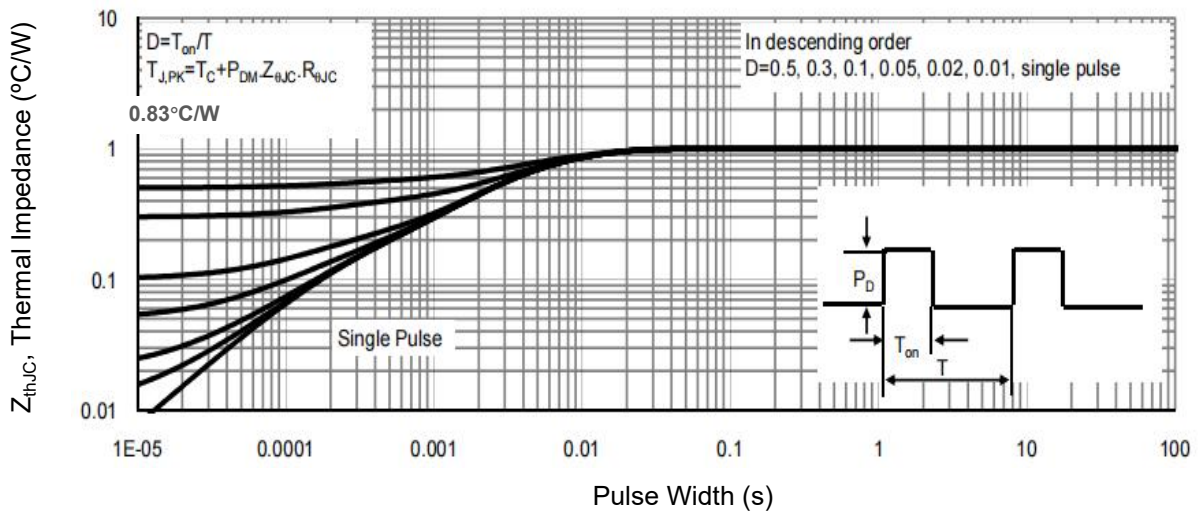
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$ , Unless Otherwise Noted)

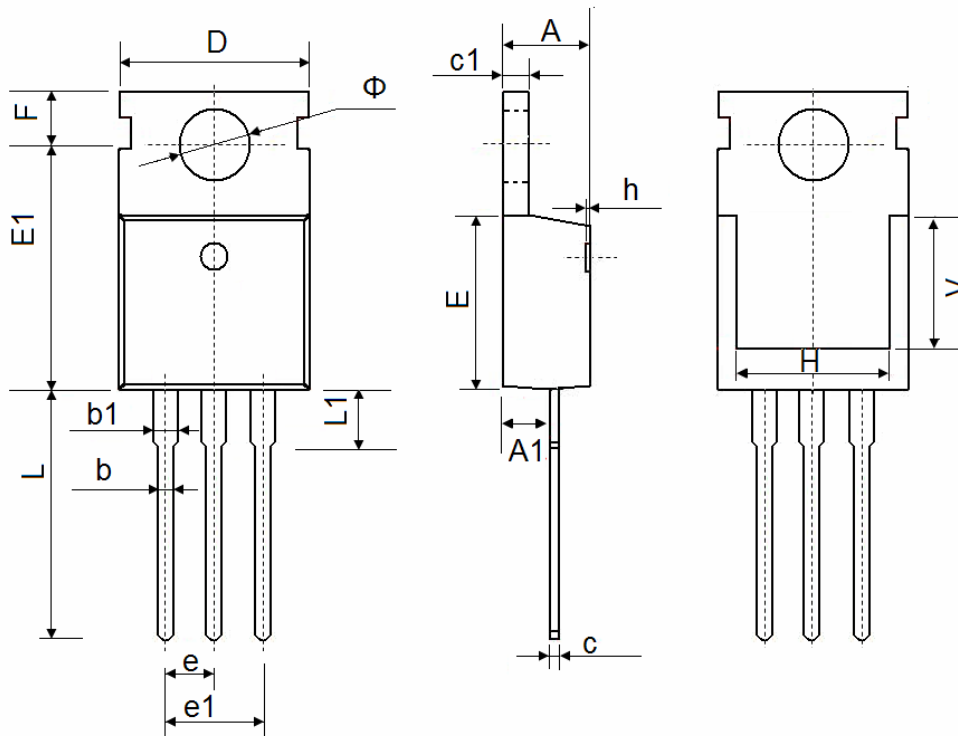
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Static Electrical Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-80	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-80V, V_{GS}=0V$	---	---	-1	$\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.2	---	-2.5	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_D=-20A$	---	13	18	m $\Omega$
		$V_{GS}=-4.5V, I_D=-15A$	---	16	21	m $\Omega$
<b>Dynamic Characteristics</b> <sup>⑤</sup>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=-40V, \text{Freq.}=1\text{MHz}$	---	6000	---	pF
$C_{oss}$	Output Capacitance		---	450	---	
$C_{rss}$	Reverse Transfer Capacitance		---	17	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{GS}=-10V, V_{DD}=-40V, I_D=-20A, R_G=3\Omega$	---	18	---	nS
$T_r$	Turn-on Rise Time		---	22	---	
$T_{d(off)}$	Turn-off Delay Time		---	55	---	
$T_f$	Turn-off Fall Time		---	35	---	
$Q_g$	Total Gate Charge	$V_{GS}=-10V, V_{DD}=-40V, I_D=-20A$	---	62	---	nC
$Q_{gs}$	Gate-Source Charge		---	9	---	
$Q_{gd}$	Gate-Drain Charge		---	16	---	
<b>Source-Drain Characteristics</b>						
$V_{SD}$ <sup>④</sup>	Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	---	---	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=-20A, di_F/dt=-100A/\mu s$	---	48	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	70	---	nC

Note ④: Pulse test (pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ ).

Note ⑤: Guaranteed by design, not subject to production testing.

**P-Channel Enhancement Mode MOSFET**
**Typical Characteristics**
**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**


**P-Channel Enhancement Mode MOSFET**
**Figure 7. Drain-Source On-Resistance**

**Figure 8. Safe Operation Area**

**Figure 9. Normalized Maximum Transient Thermal Impedance**


**P-Channel Enhancement Mode MOSFET**
**TO-220 Package Outline Data**


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.350	4.650
A1	2.250	2.550
b	0.710	0.910
b1	1.170	1.400
c	0.330	0.650
c1	1.200	1.400
D	9.910	10.250
E	8.9500	9.750
E1	12.650	12.950
e	2.540 TYP.	
e1	4.980	5.180
F	2.650	2.950
H	7.900	8.100
h	0.000	0.300
L	12.700	13.500
L1	2.850	3.250
V	7.500 REF.	
Φ	3.400	3.800