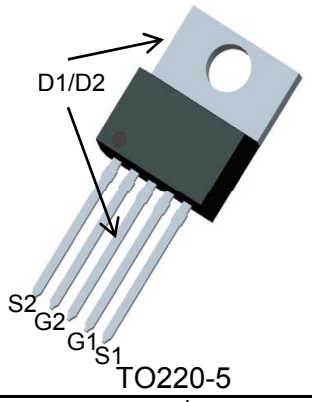
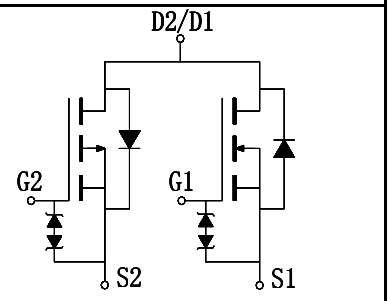
Features

• N-Channel
60V/20A,
$R_{DS\ (ON)}$ =30mΩ(Typ.) @ V_{GS}=10V
• P-Channel
-60V/-15A,
$R_{DS\ (ON)}$ =110mΩ (Typ.) @ V_{GS}=-10V
• Reliable and Rugged
• ESD Protected
• Lead Free and Green Available

Pin Description



TO220-5



Complementary MOSFET

Applications

• Power Management

Absolute Maximum Ratings

Symbol	Parameter		N-Channel	P-Channel	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)					
V_{DSS}	Drain-Source Voltage		60	-60	V
V_{GSS}	Gate-Source Voltage		±16	±16	
T_J	Maximum Junction Temperature		175	175	°C
T_{STG}	Storage Temperature Range		-55 to 175	-55 to 175	°C
I_S	Diode Continuous Forward Current	T_C=25°C	20	-15	A
Mounted on Large Heat Sink					
I_{DP} ①	300μs Pulse Drain Current Tested	T_C=25°C	80	-60	A
I_D ②	Continuous Drain Current(V_{GS}=±10V)	T_C=25°C	20	-15	A
		T_C=100°C	16	-10	
P_D	Maximum Power Dissipation	T_C=25°C	50	50	W
		T_C=100°C	25	25	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		3	3	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	62.5	°C/W
Drain-Source Avalanche Ratings					
E_{AS} ③	Avalanche Energy, Single Pulsed		42	72	mJ

Electrical Characteristics (T_C=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Condition		RU60C20R5			Unit
				Min.	Typ.	Max.	
Static Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	N	60			V
		V_{GS}=0V, I_{DS}=-250μA	P	-60			
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=60V, V_{GS}=0V	N			1	μA
		T_J=125°C	N			30	
		V_{DS}=-60V, V_{GS}=0V	P			-1	
		T_J=125°C	P			-30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	N	2		4	V
		V_{DS}=V_{GS}, I_{DS}=-250μA	P	-2		-4	
I_{GSS}	Gate Leakage Current	V_{GS}=±16V, V_{DS}=0V	N			±10	μA
		V_{GS}=±16V, V_{DS}=0V	P			±10	
$R_{DS(ON)}$ ④	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=10A	N		30	50	mΩ
		V_{GS}=-10V, I_{DS}=-8A	P		110	120	
Diode Characteristics							
V_{SD} ④	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V	N			1.2	V
		I_{SD}=-15A, V_{GS}=0V	P			-1.2	
t_{rr}	Reverse Recovery Time	N-Channel I_{SD}=20A, dI_{SD}/dt=100A/μs	N		32		ns
			P		52		
Q_{rr}	Reverse Recovery Charge	P-Channel I_{SD}=-15A, dI_{SD}/dt=100A/μs	N		63		nC
			P		75		
Dynamic Characteristics ⑤							
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	N		1.8		Ω
			P		12		
C_{iss}	Input Capacitance	N-Channel V_{GS}=0V,V_{DS}=30V, Frequency=1.0MHz	N		1340		pF
			P		910		
C_{oss}	Output Capacitance	P-Channel V_{GS}=0V,V_{DS}=-30V, Frequency=1.0MHz	N		285		
			P		625		
C_{rss}	Reverse Transfer Capacitance		N		90		
			P		170		

Electrical Characteristics (T_C=25°C Unless Otherwise Noted)

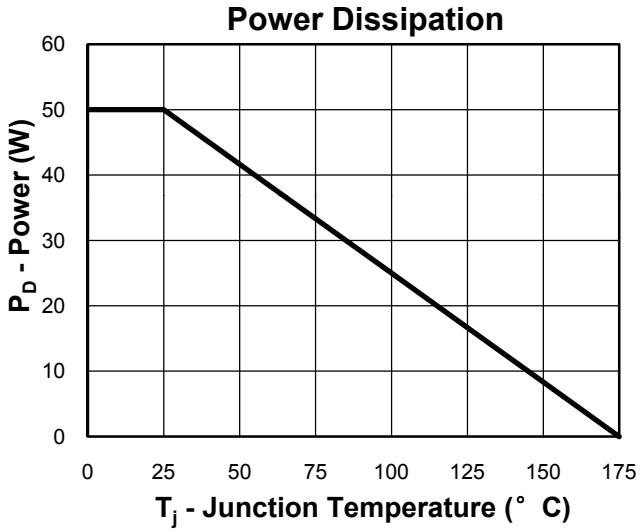
Symbol	Parameter	Test Condition		RU60C20R5			Unit
				Min.	Typ.	Max.	
Dynamic Characteristics⑤							
$t_{d(ON)}$	Turn-on Delay Time	N-Channel V_{DD}=30V, R_L=1.5Ω,I_{DS}=20A, V_{GEN}=10V, R_G=6Ω P-Channel V_{DD}=-30V, R_L=2Ω,I_{DS}=-15A, V_{GEN}= -10V, R_G=6Ω	N		12		ns
			P		16		
t_r	Turn-on Rise Time		N		15		
			P		24		
$t_{d(OFF)}$	Turn-off Delay Time		N		28		
			P		35		
t_f	Turn-off Fall Time		N		15		
			P		20		
Gate Charge Characteristics⑤							
Q_g	Total Gate Charge	N-Channel V_{DS}=48V, V_{GS}=10V, I_{DS}=20A P-Channel V_{DS}=-48V, V_{GS}= -10V, I_{DS}=-15A	N		53		nC
			P		32		
Q_{gs}	Gate-Source Charge		N		8		
			P		5		
Q_{gd}	Gate-Drain Charge		N		27		
			P		11		

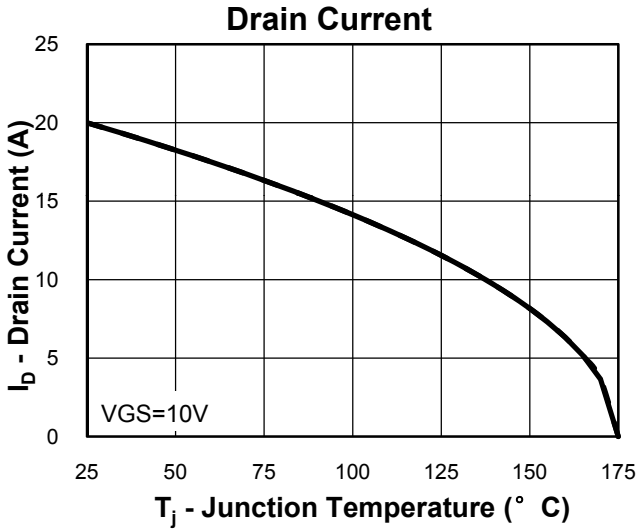
Notes:
①Pulse width limited by safe operating area.
②Calculated continuous current based on maximum allowable junction temperature.
③Limited by T_{Jmax}, N-Channel:I_{AS} =13A, V_{DD} =48V, R_G = 50Ω,P-Channel: IAS =-17A, VDD =-48V, RG = 50Ω,Starting T_J = 25°C.
④Pulse test;Pulse width≤300μs, duty cycle≤2%.
⑤Guaranteed by design, not subject to production testing.

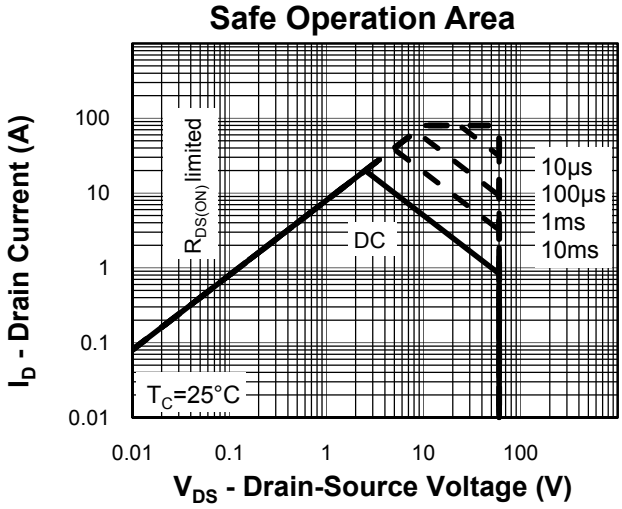
Ordering and Marking Information

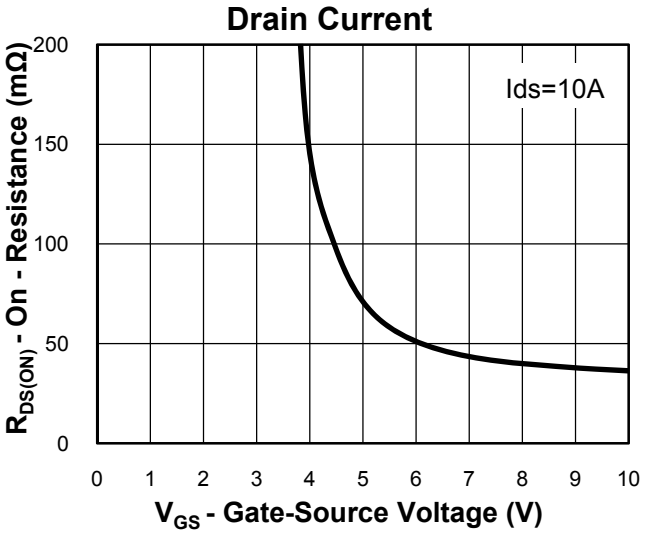
Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU60C20R5	RU60C20R5	TO220-5	Tube	50	-	-

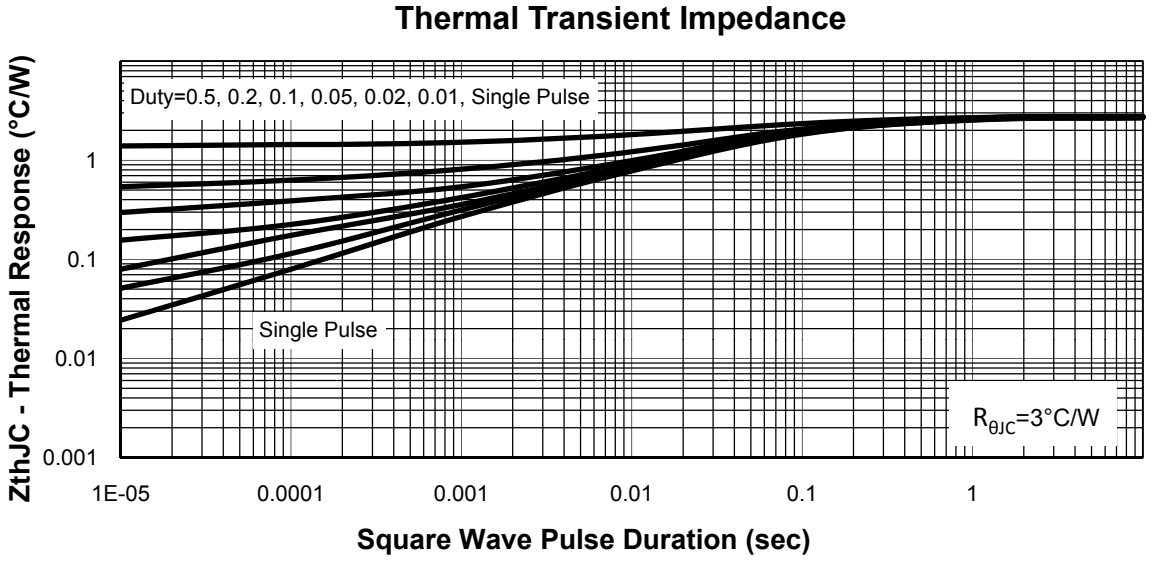
Typical Characteristics(N-Channel)



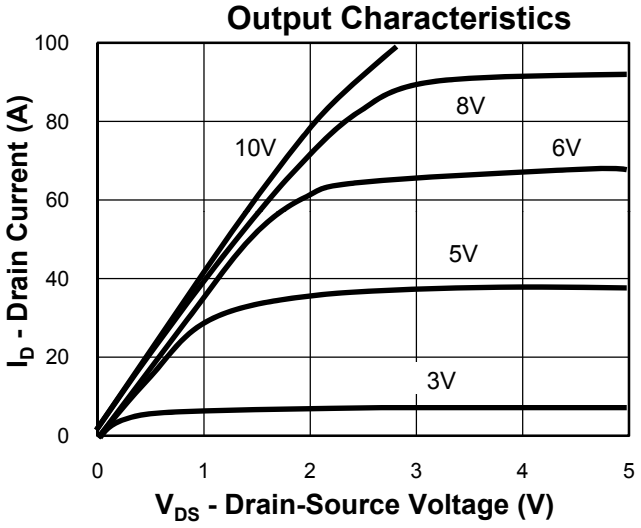


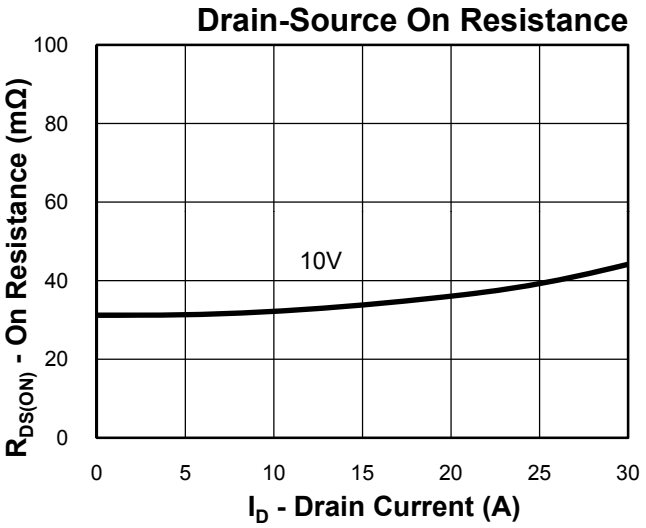


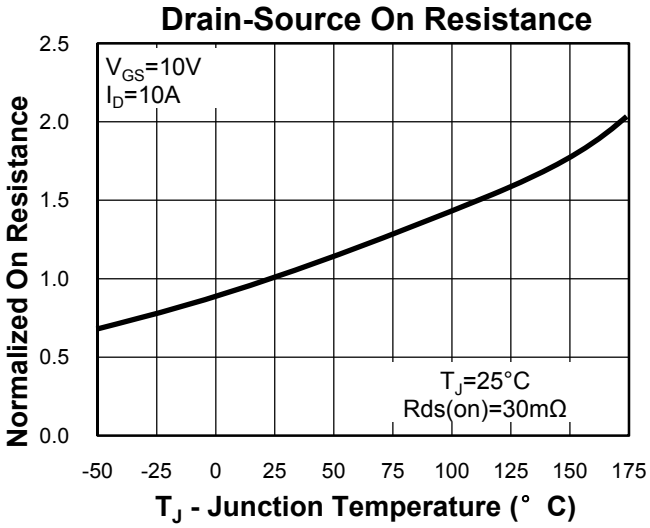


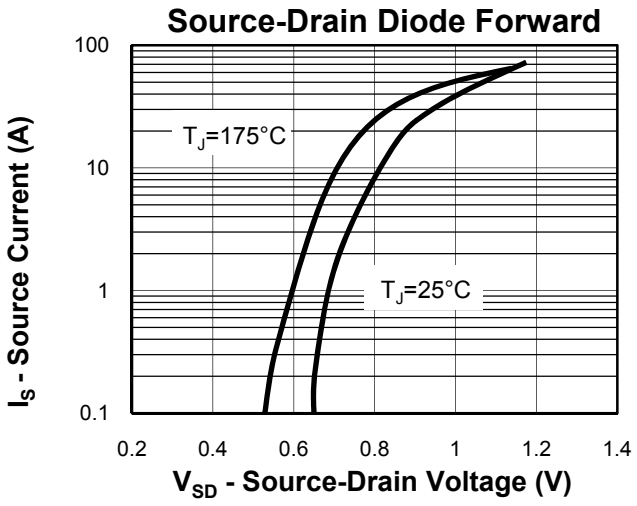


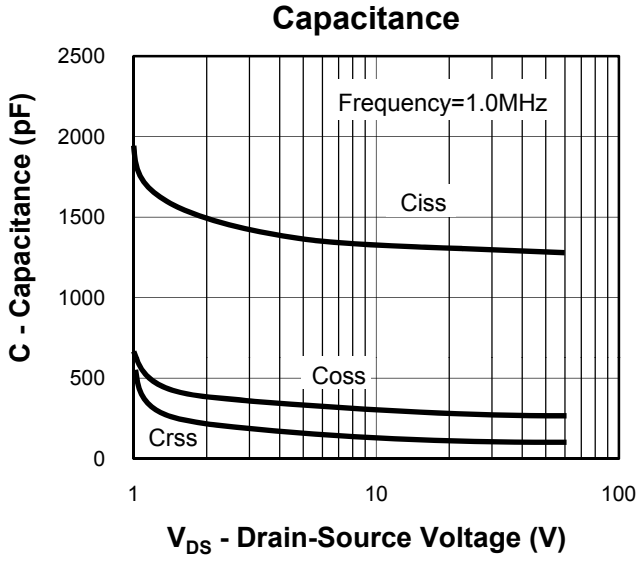
Typical Characteristics(N-Channel)

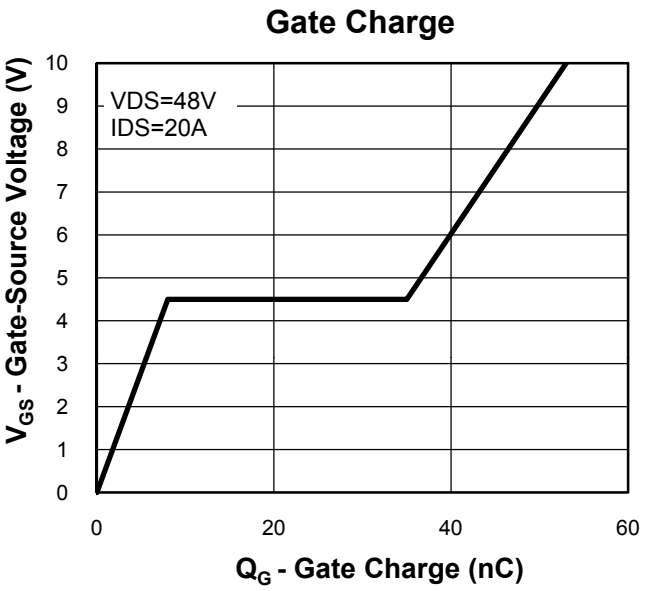






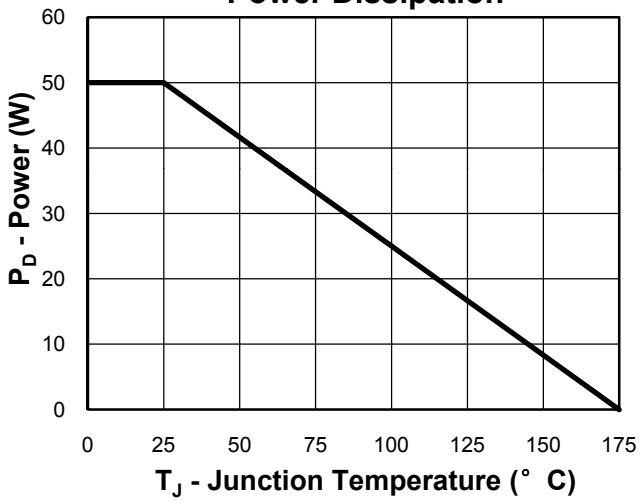




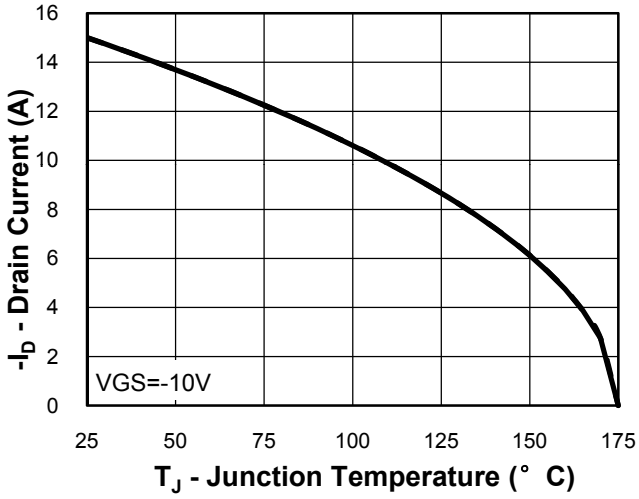


Typical Characteristics(P-Channel)

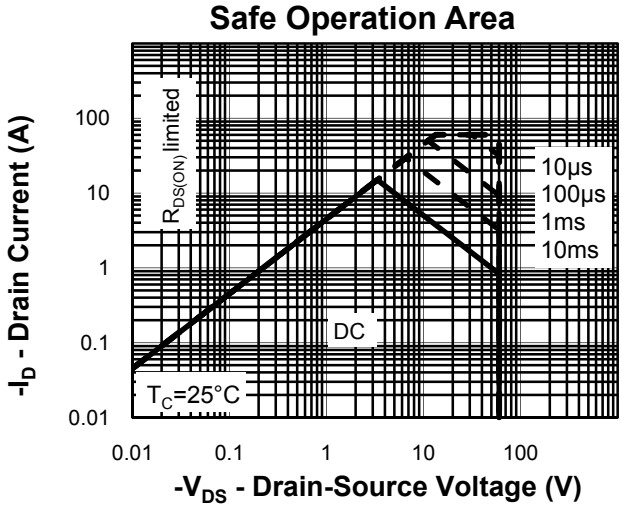
Power Dissipation



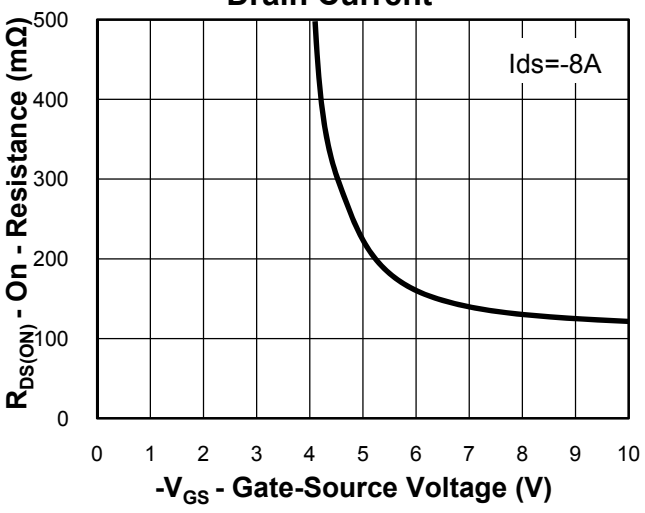
Drain Current



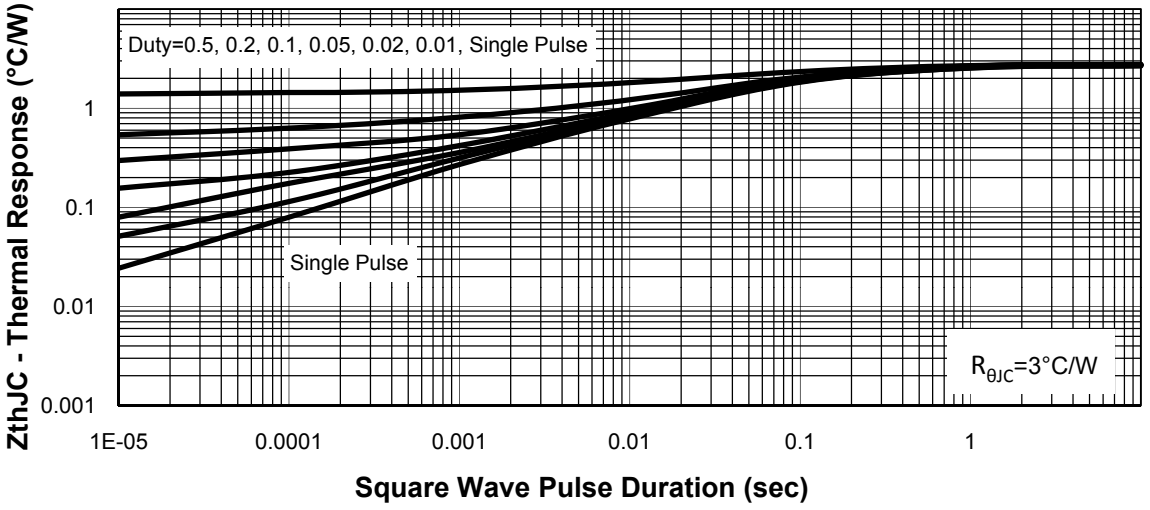
Safe Operation Area



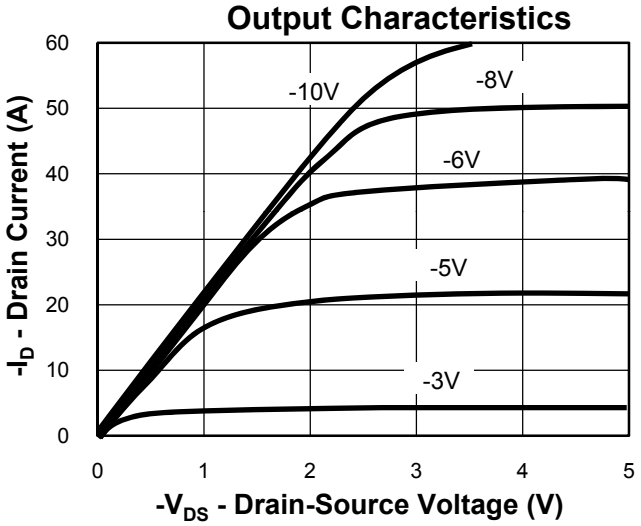
Drain Current

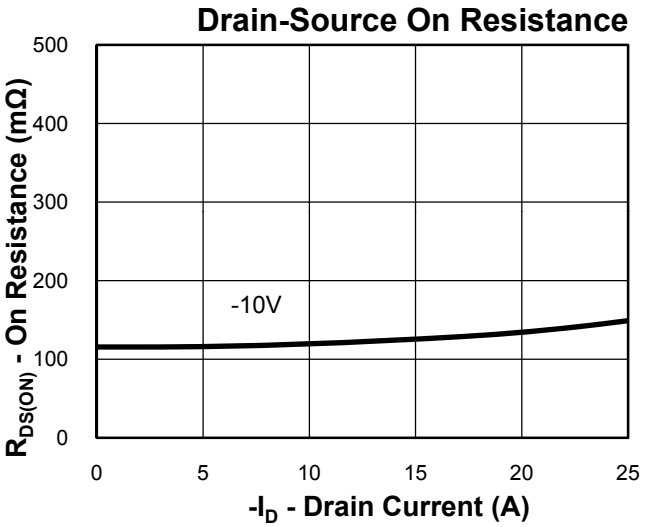


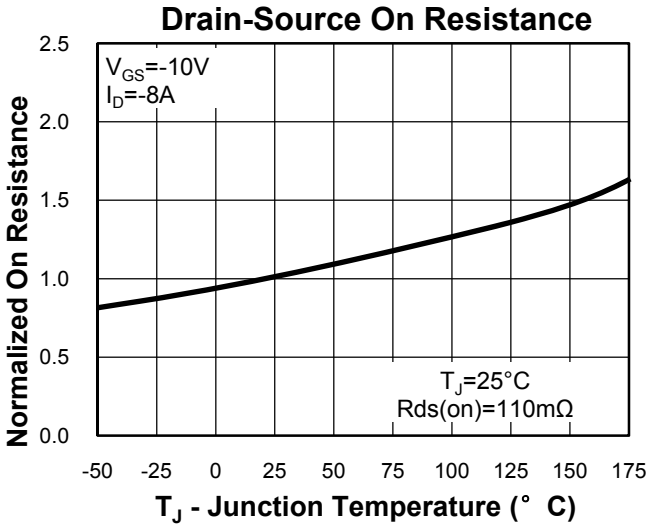
Thermal Transient Impedance

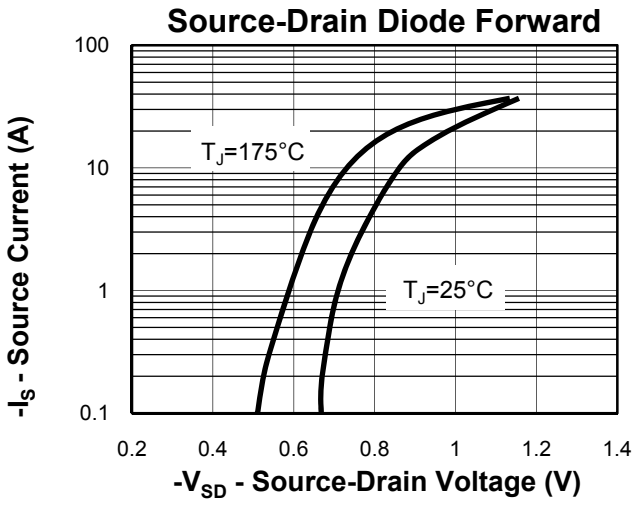


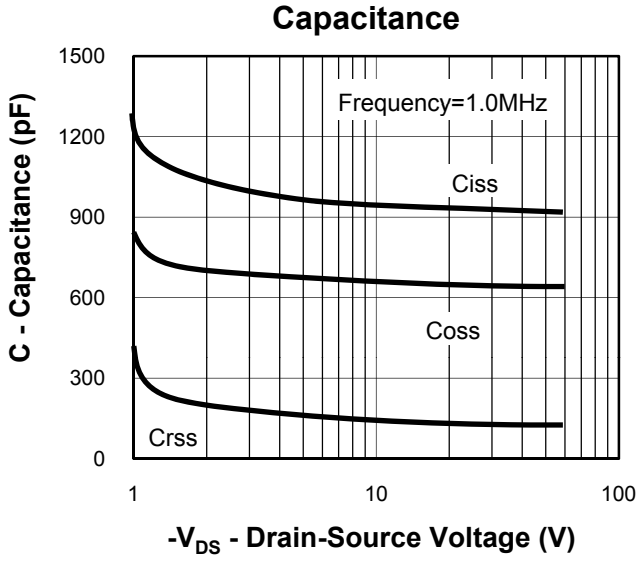
Typical Characteristics(P-Channel)

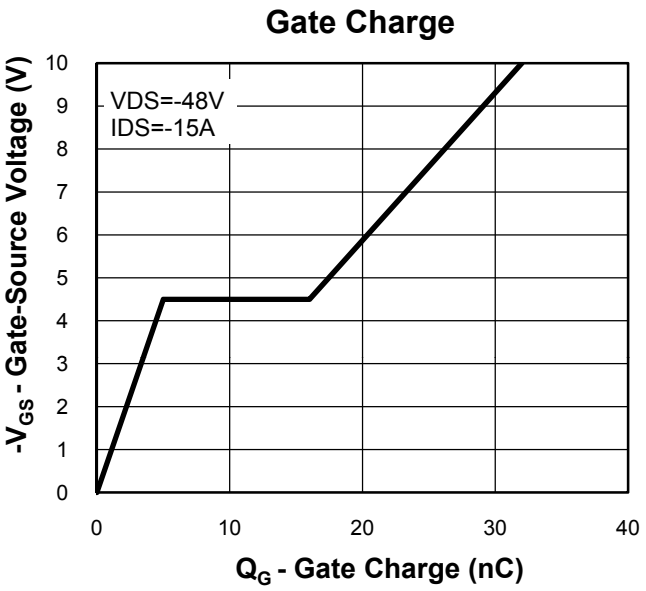






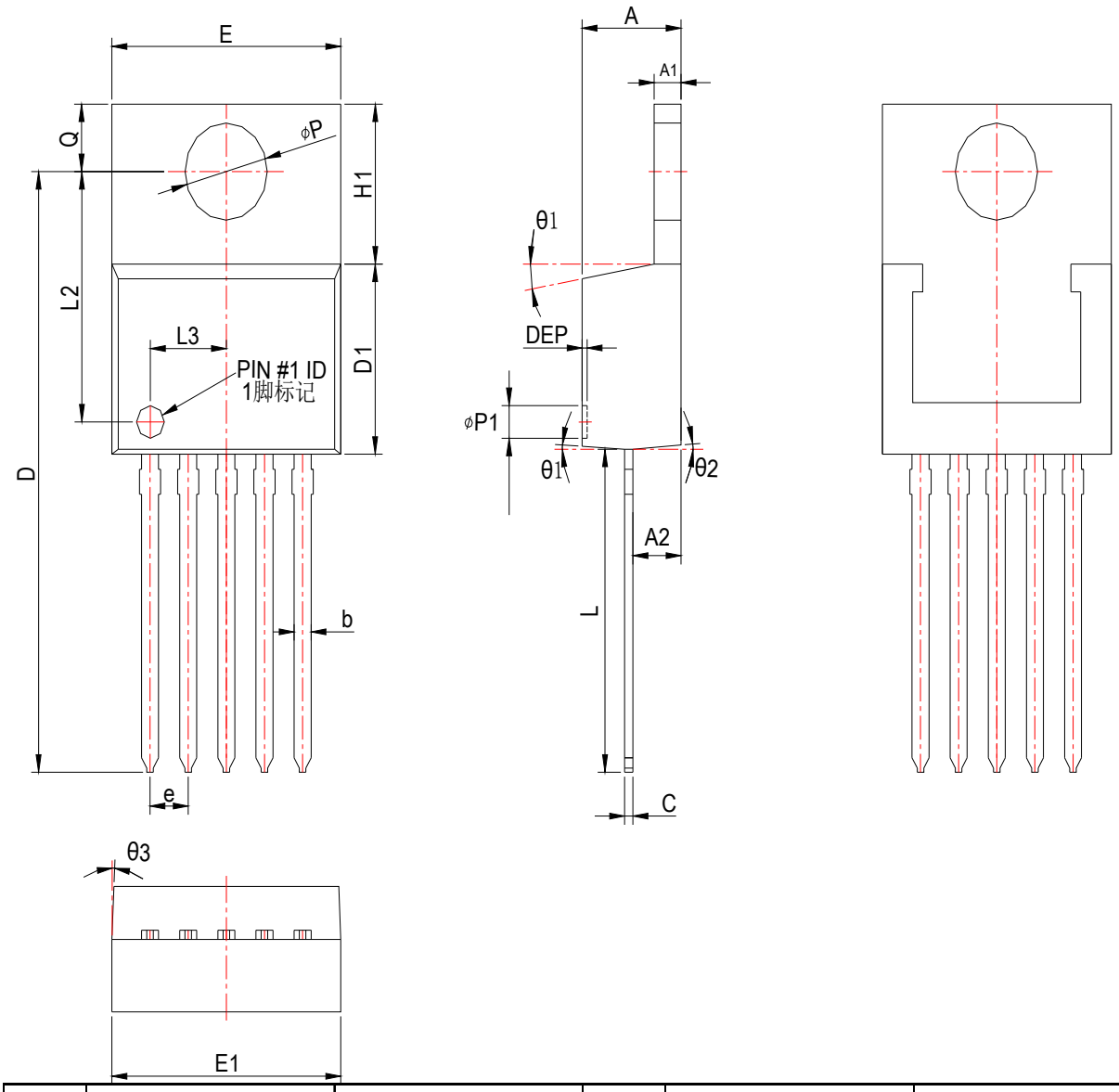






Package Information

TO220-5



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	4.45	4.58	4.70	0.175	0.180	0.185	L	13.34	13.72	14.10	0.525	0.540	0.555
A1	1.22	1.27	1.32	0.048	0.050	0.052	L2	10.77REF			0.424REF		
A2		2.67			0.105		L3	3.40REF			0.134REF		
b	0.76	0.89	1.02	0.030	0.035	0.040	Φp	3.78	3.84	3.89	0.149	0.151	0.153
c	0.33	0.49	0.64	0.013	0.019	0.025	Φp1	1.07	1.20	1.32	0.042	0.047	0.052
D	25.78	26.04	26.29	1.015	1.025	1.035	Q	2.54	2.80	3.05	0.100	0.110	0.120
D1	8.38	8.64	8.89	0.330	0.340	0.350	θ1		7°			7°	
E	10.13	10.26	10.39	0.399	0.404	0.409	θ2		3°			3°	
E1	10.03	10.29	10.54	0.395	0.405	0.415	θ3		3°			3°	
e	1.57	1.70	1.83	0.062	0.067	0.072	DEP	0.10	0.18	0.25	0.004	0.007	0.010
H1	6.10	6.35	6.60	0.240	0.250	0.260							

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