

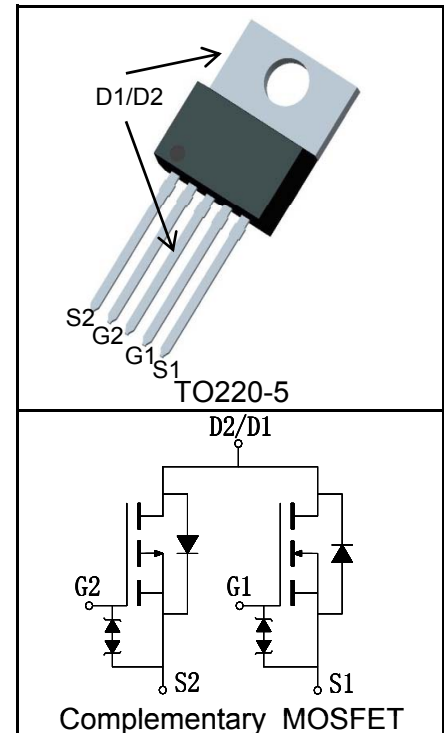
Features

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

Applications

- Power Management

Pin Description



Absolute Maximum Ratings

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

Electrical Characteristics ($T_C=25^{\circ}\text{C}$ 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			30		
		V _{DS} =-60V, V _{GS} =0V	P		-1		
		T _J =125°C			-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	mΩ	
		V _{GS} =-10V, I _{DS} =-8A	P		110		
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		N		285		
			P		625		
C _{rss}	Reverse Transfer Capacitance		N		90		
			P		170		

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

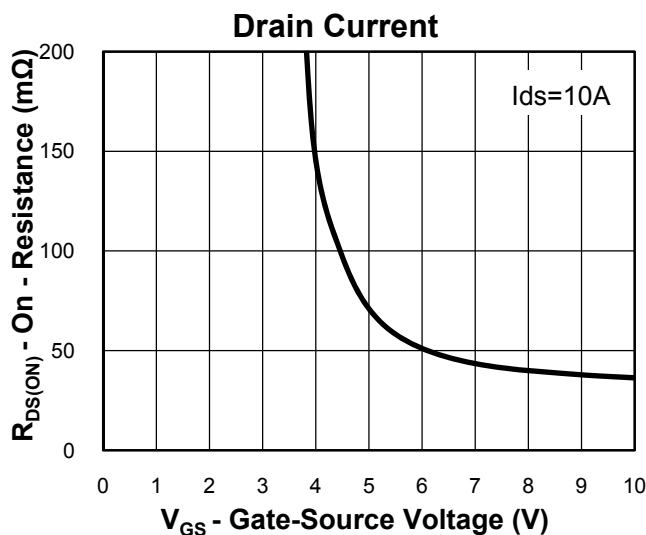
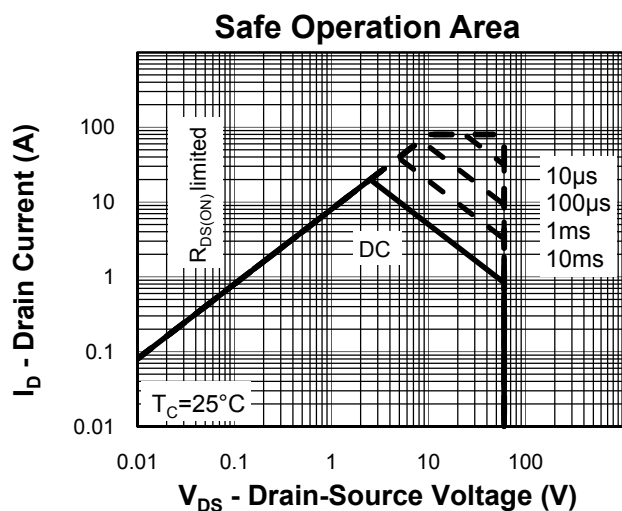
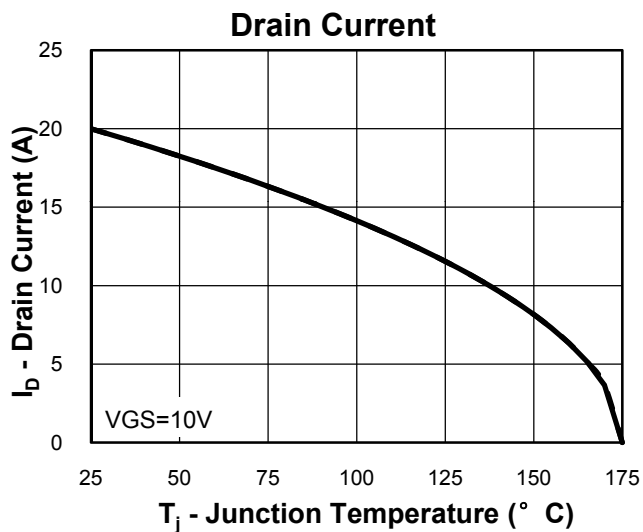
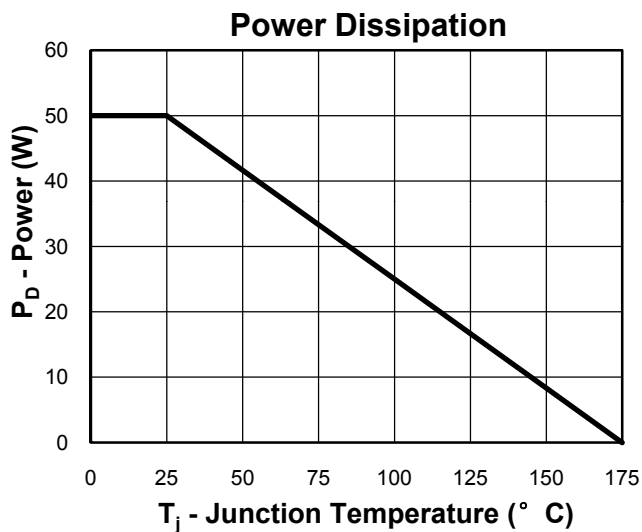
Symbol	Parameter	Test Condition	RU60C20R5			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics ^⑤						
t _{d(ON)}	Turn-on Delay Time	N-Channel V _{DD} =30V, R _L =1.5Ω, I _{DS} =20A, V _{GEN} =10V, R _G =6Ω	N		12	ns
			P		16	
t _r	Turn-on Rise Time		N		15	
			P		24	
t _{d(OFF)}	Turn-off Delay Time	P-Channel V _{DD} =-30V, R _L =2Ω, I _{DS} =-15A, V _{GEN} = -10V, R _G =6Ω	N		28	
			P		35	
t _f	Turn-off Fall Time		N		15	
			P		20	
Gate Charge Characteristics ^⑤						
Q _g	Total Gate Charge	N-Channel V _{DS} =48V, V _{GS} =10V, I _{DS} =20A	N		53	nC
			P		32	
Q _{gs}	Gate-Source Charge	P-Channel V _{DS} =-48V, V _{GS} = -10V, I _{DS} =-15A	N		8	
			P		5	
Q _{gd}	Gate-Drain Charge		N		27	
			P		11	

- Notes:**
- ① Pulse width limited by safe operating area.
 - ② Calculated continuous current based on maximum allowable junction temperature.
 - ③ Limited by T_{Jmax} , N-Channel: $I_{AS}=13\text{A}$, $V_{DD}=48\text{V}$, $R_G=50\Omega$, P-Channel: $I_{AS}=-17\text{A}$, $V_{DD}=-48\text{V}$, $R_G=50\Omega$, Starting $T_J=25^{\circ}\text{C}$.
 - ④ Pulse test; Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
 - ⑤ Guaranteed by design, not subject to production testing.

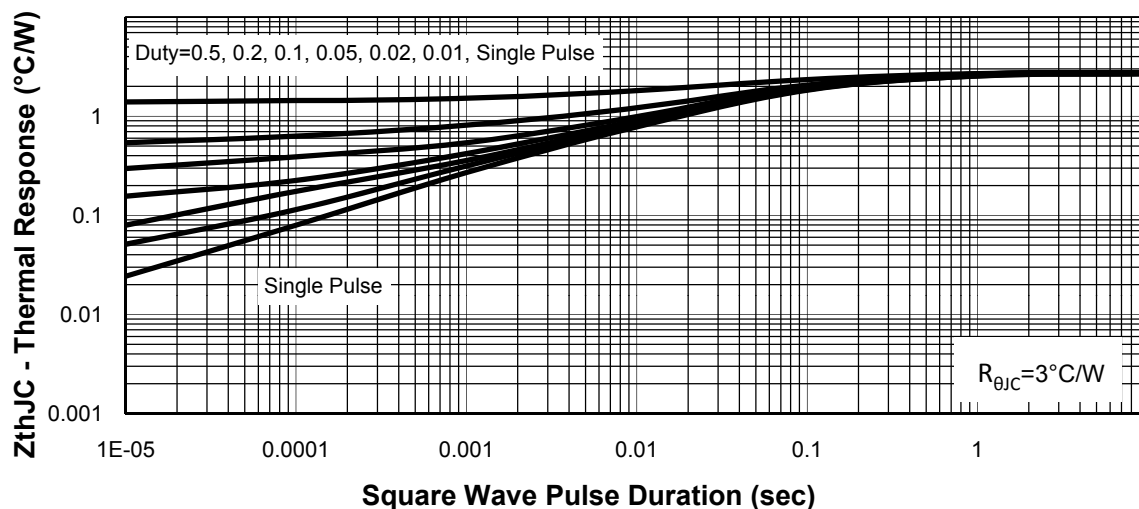
Ordering and Marking Information

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

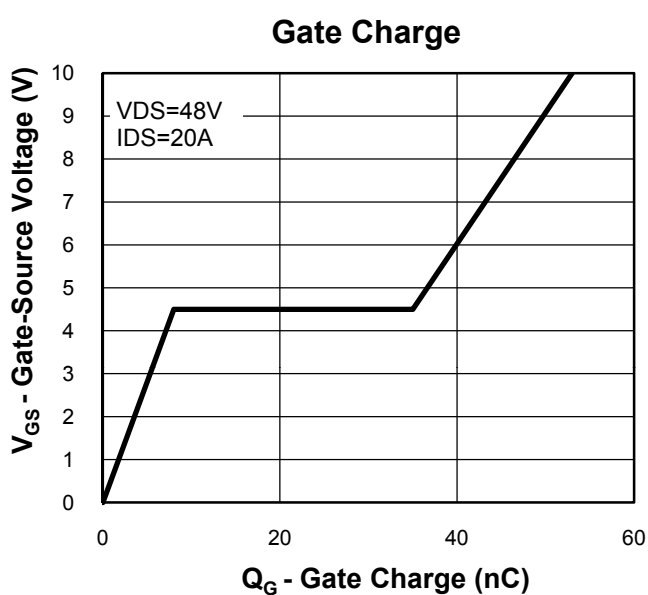
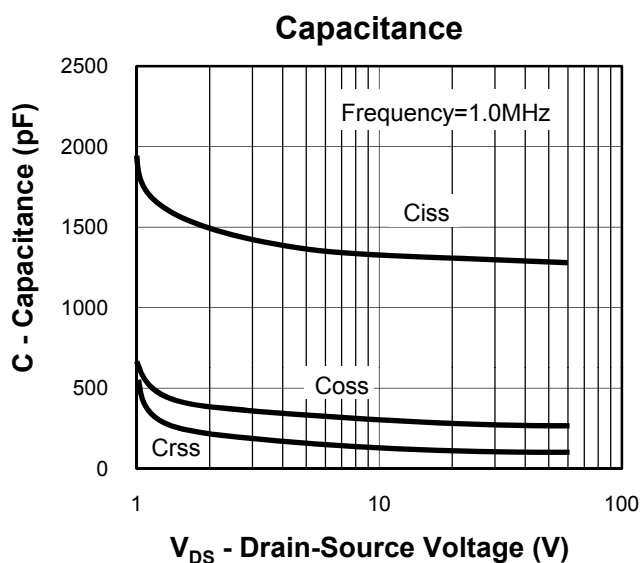
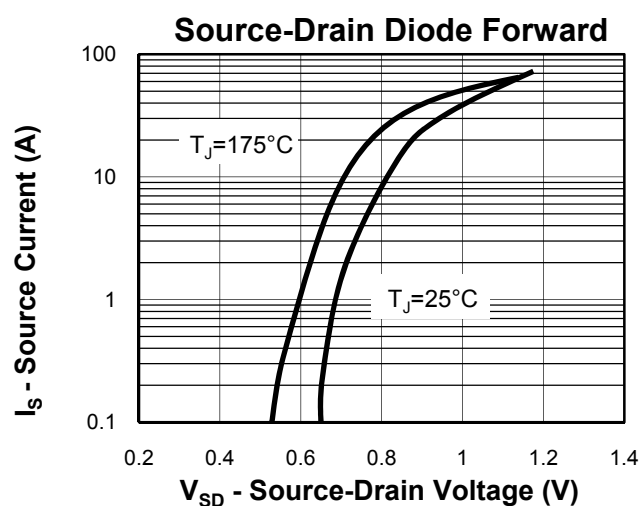
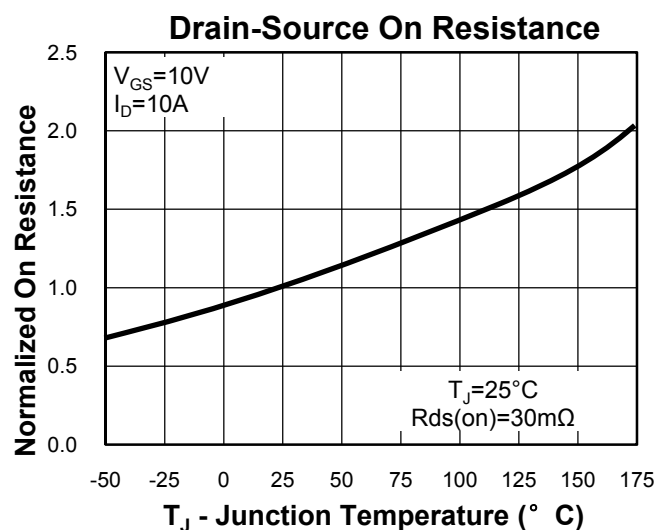
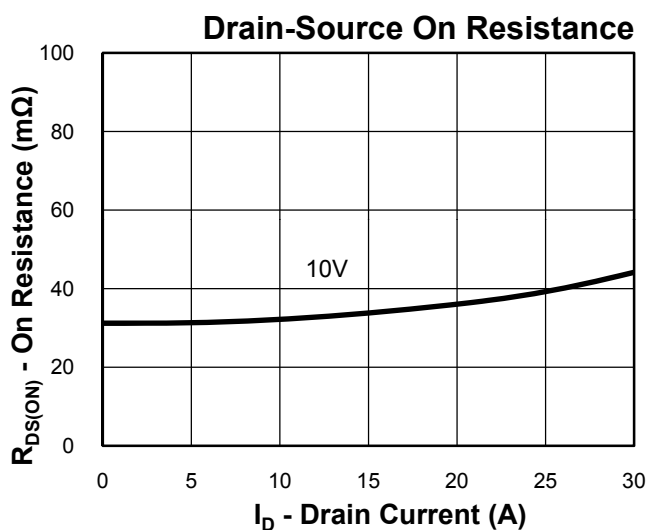
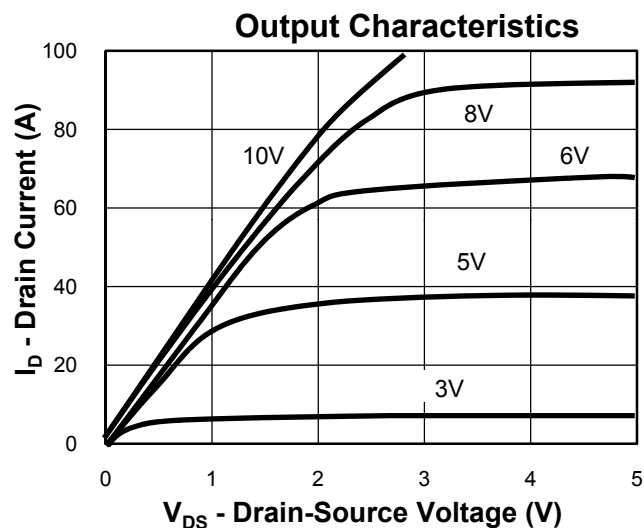
Typical Characteristics(N-Channel)



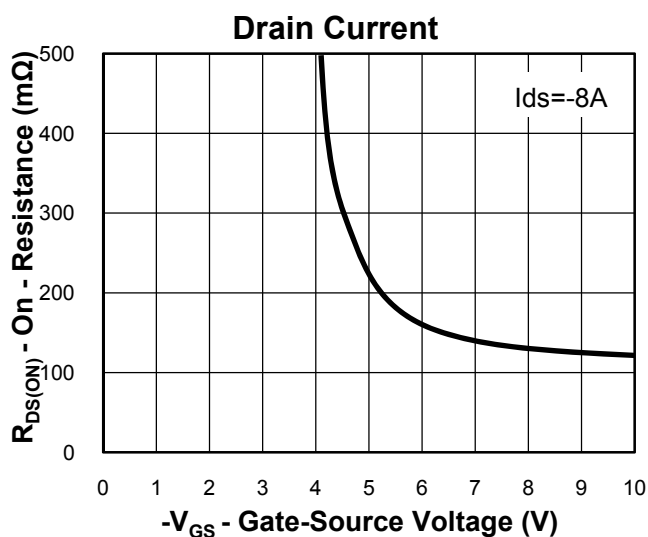
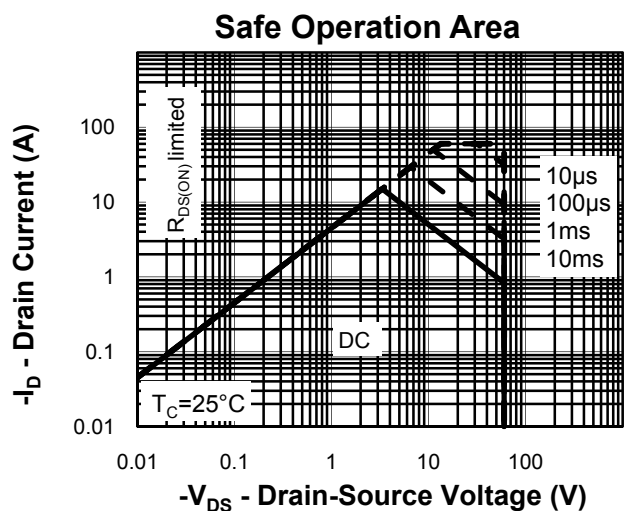
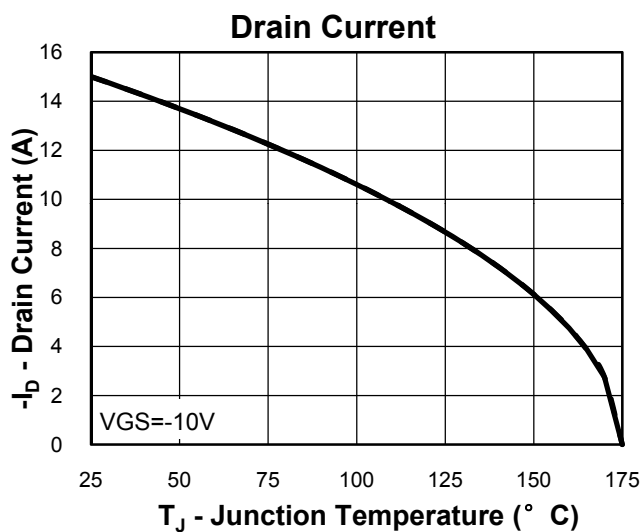
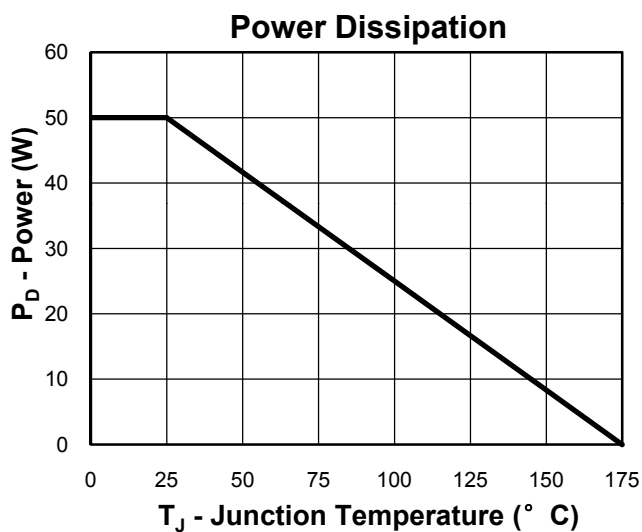
Thermal Transient Impedance



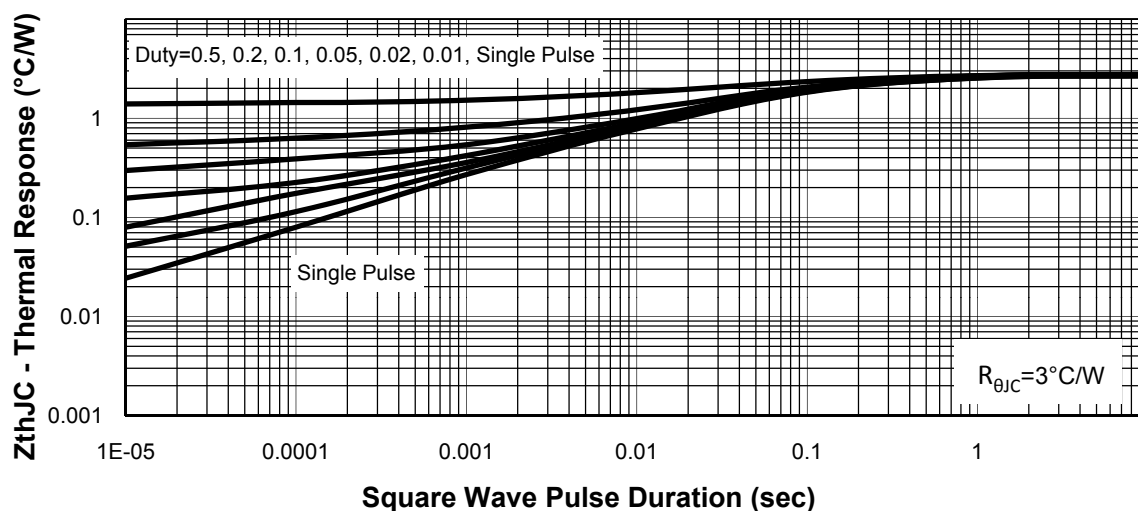
Typical Characteristics(N-Channel)



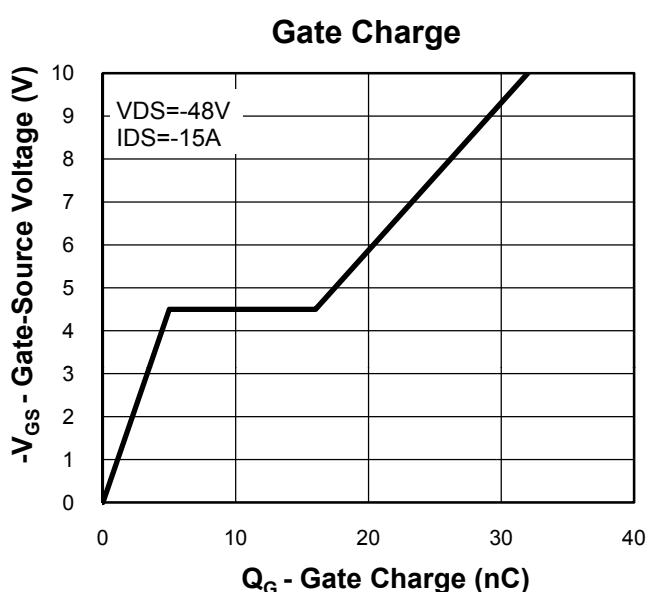
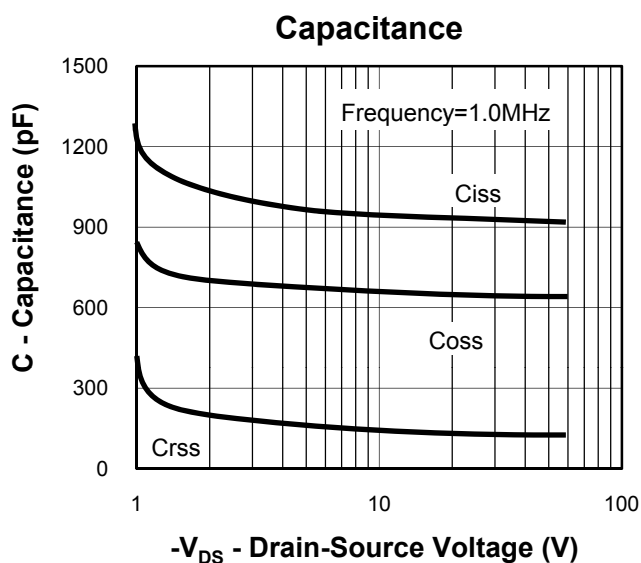
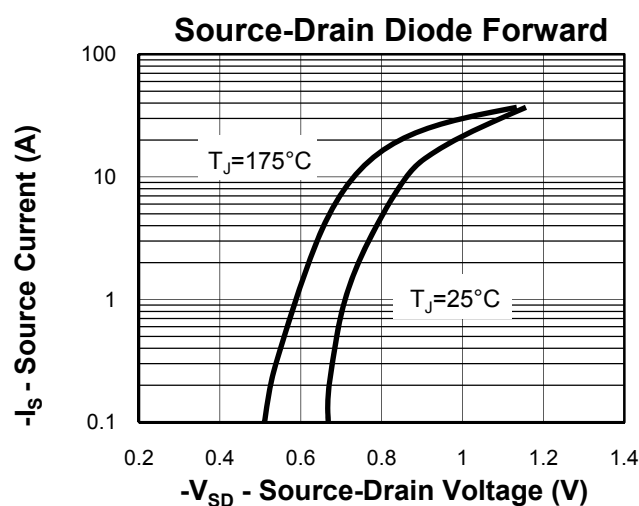
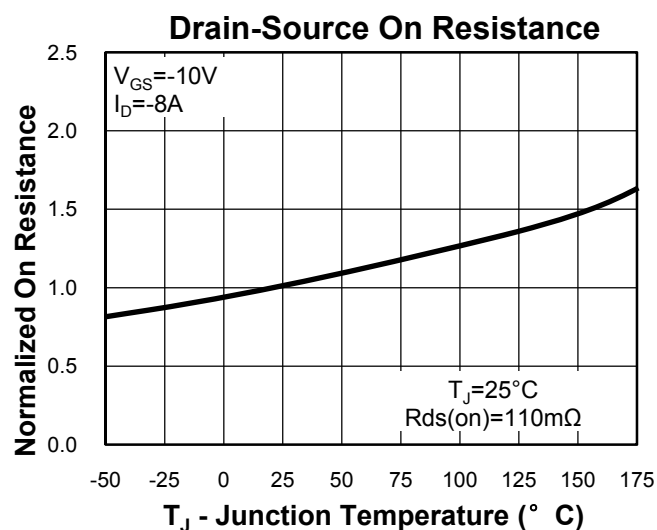
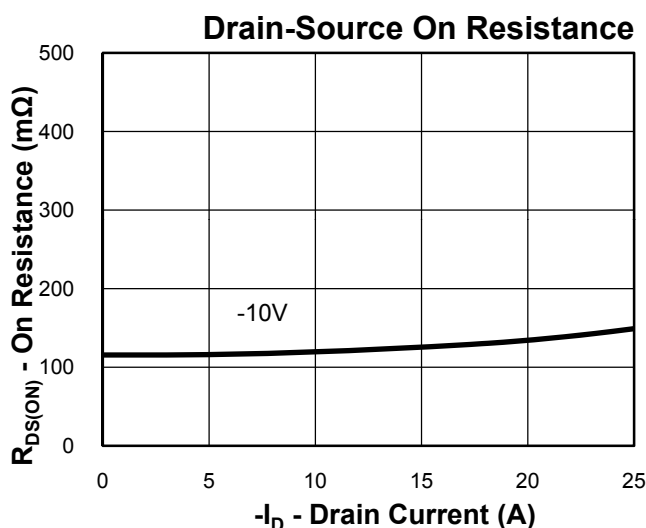
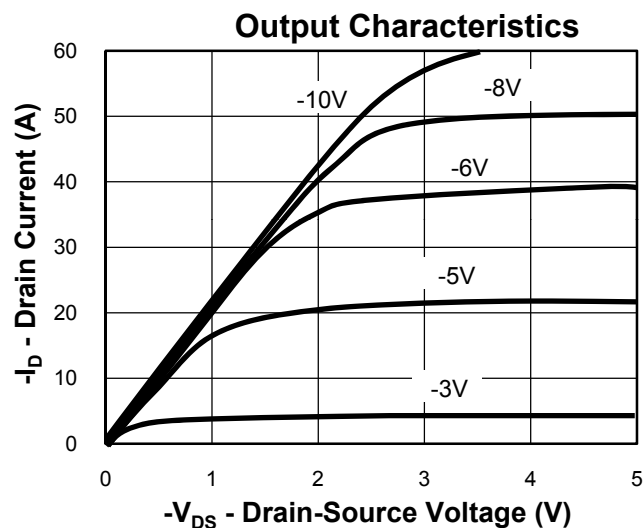
Typical Characteristics(P-Channel)



Thermal Transient Impedance

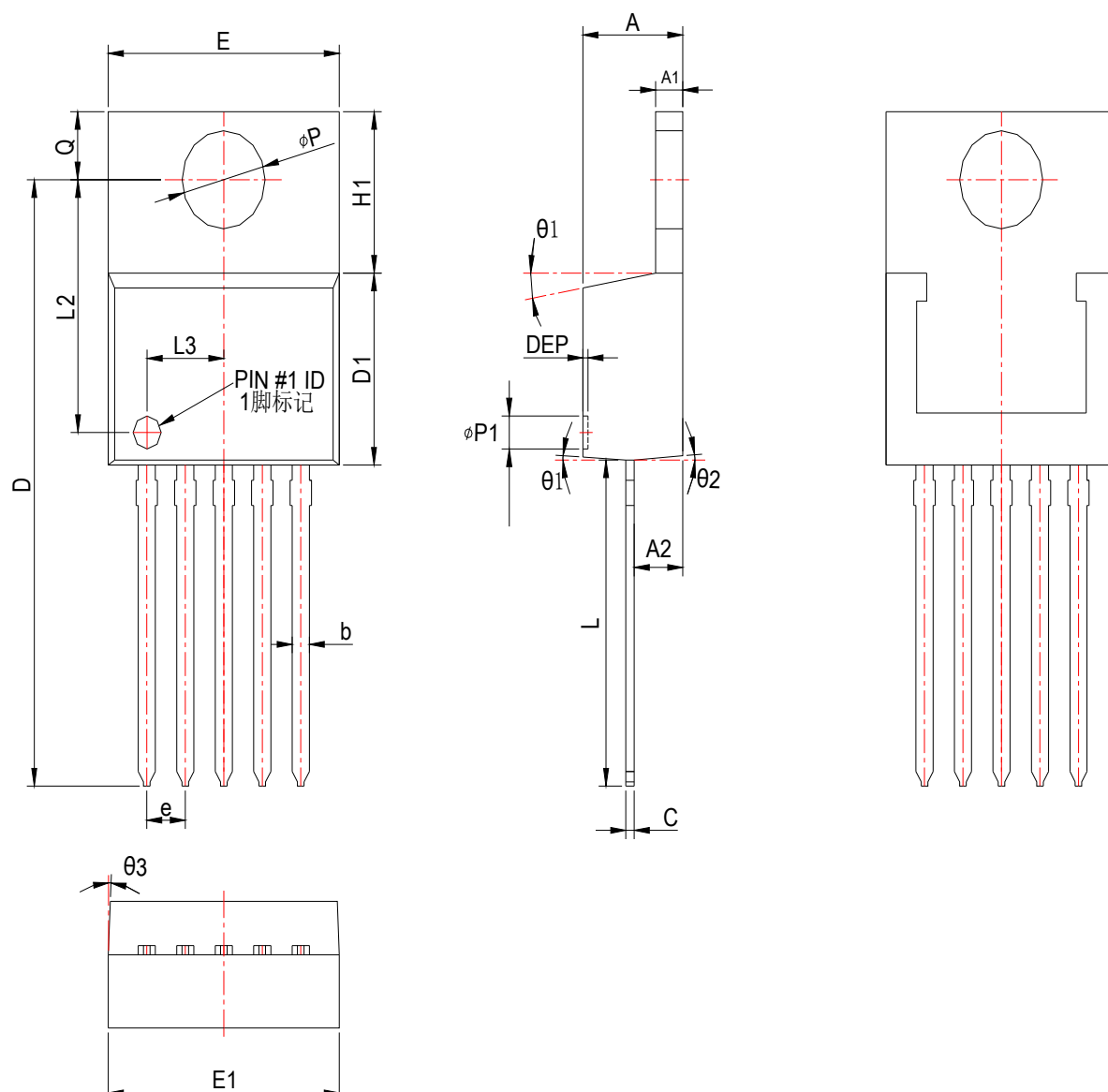


Typical Characteristics(P-Channel)



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	$\Phi p1$	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	$\theta 1$		7°			7°	
E	10.13	10.26	10.39	0.399	0.404	0.409	$\theta 2$		3°			3°	
E1	10.03	10.29	10.54	0.395	0.405	0.415	$\theta 3$		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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