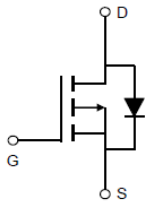
AP45P20Q

P-Channel Enhancement Mosfet

DATA SHEET

Feature

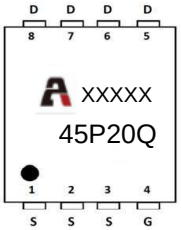
- -20V,-55A
  $R_{DS(ON)}$ TYP=5.8mΩ@V_{GS}=4.5V
  $R_{DS(ON)}$ TYP=7.8mΩ@V_{GS}=2.5V
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram

Application

- PWM applications
- Load Switch
- Power management



Marking and pin Assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
45P20Q	AP45P20Q	PDFN3X3	13 inch	-	5000

ABSOLUTE MAXIMUM RATINGS (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current (T_J =25℃)	I_D	-55	A
Continuous Drain Current (T_J =100℃)	I_D	-32	A
Pulsed Drain Current (1)	I_{DM}	-200	A
Single Pulsed Avalanche Energy(4)	EAS	43	mJ
Power Dissipation	P_D	42	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	3.0	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

MOSFET ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

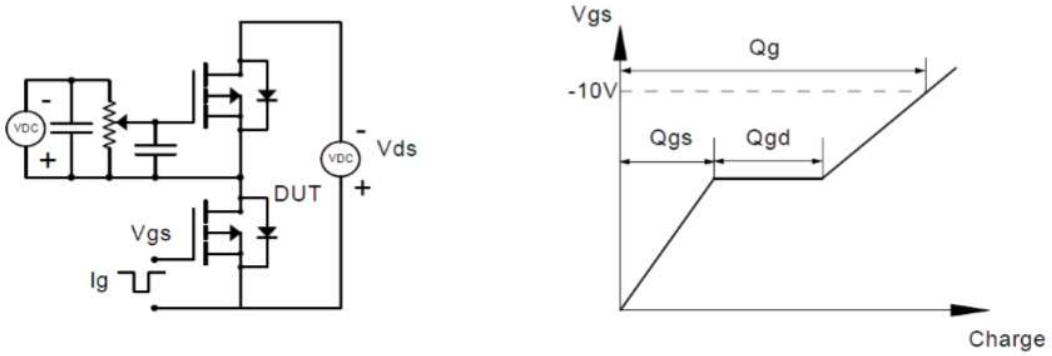
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-20V, V_{GS} = 0V	-	-	1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±12V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage(2)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	0.35	0.65	1.0	V
Drain-source on-resistance(2)	$R_{DS(on)}$	V_{GS} =-4.5V, I_D =-15A	-	5.8	7.6	mΩ
		V_{GS} =-2.5V, I_D =-10A	-	7.8	10	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =-10V, V_{GS} =0V, f =1MHz	-	2790	-	pF
Output Capacitance	C_{oss}		-	310	-	
Reverse Transfer Capacitance	C_{rss}		-	270	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=-4.5V, I_D=-15A V_{GS}=-4.5V, R_G=3Ω	-	13	-	ns
Turn-on rise time	t_r		-	105	-	
Turn-off delay time	$t_{d(off)}$		-	145	-	
Turn-off fall time	t_f		-	150	-	
Total Gate Charge	Qg	VDS=-4.5V, ID=-15A, VGS=-4.5V	-	54	-	nC
Gate-Source Charge	Qgs		-	7	-	
Gate-Drain Charge	Qgd		-	14	-	
Source-Drain Diode characteristics						
Diode Forward voltage(2)	V_{DS}	V_{GS} =0V, I_S=-10A	-	-	-1.2	V
Diode Forward current(3)	I_S		-	-	-55	A

Notes:

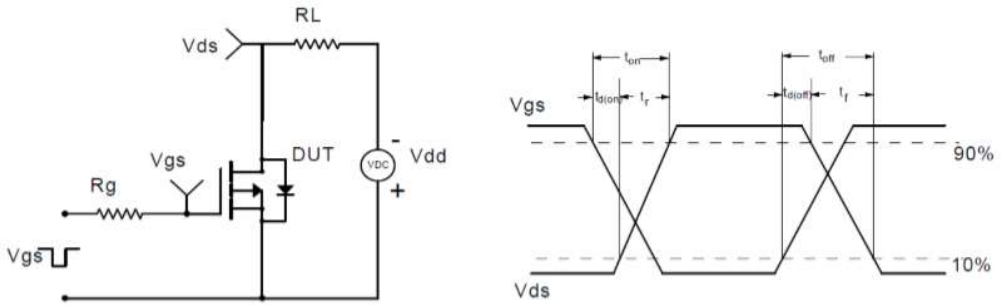
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width≤300μs, duty cycle≤2%
3. Surface Mounted on FR4 Board,t≤10 sec
4. EAS condition: V_{DD}=-10V,V_G=-10V，R_G=25Ω，L=0.5mH，I_{AS}=13A

Test Circuit

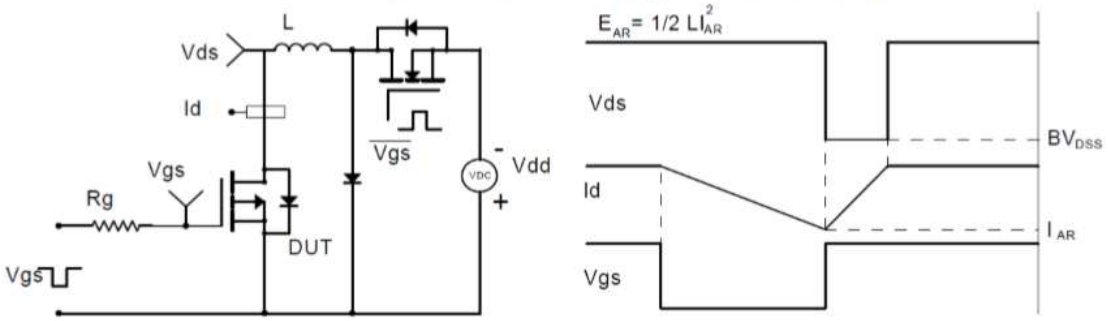
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

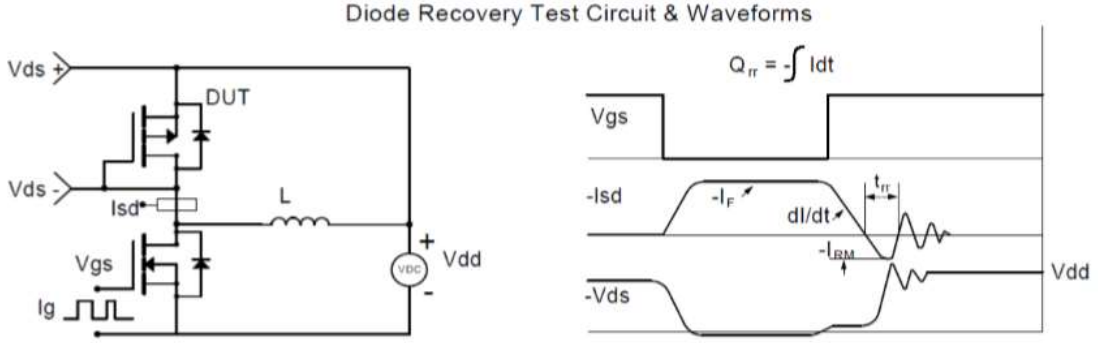


Figure 1: Output Characteristics

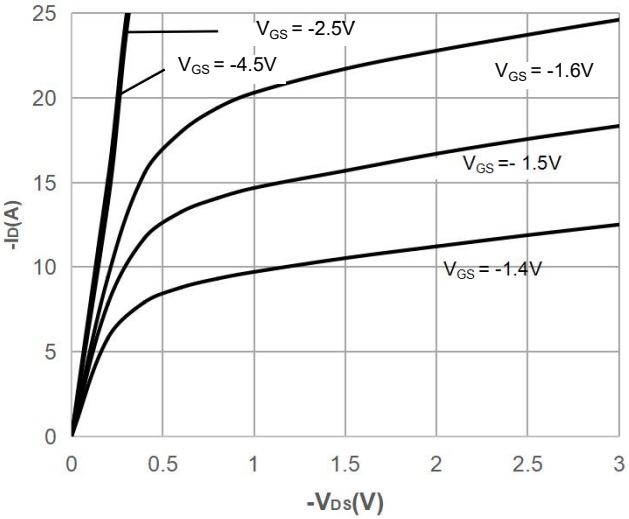


Figure 2: Typical Transfer Characteristics

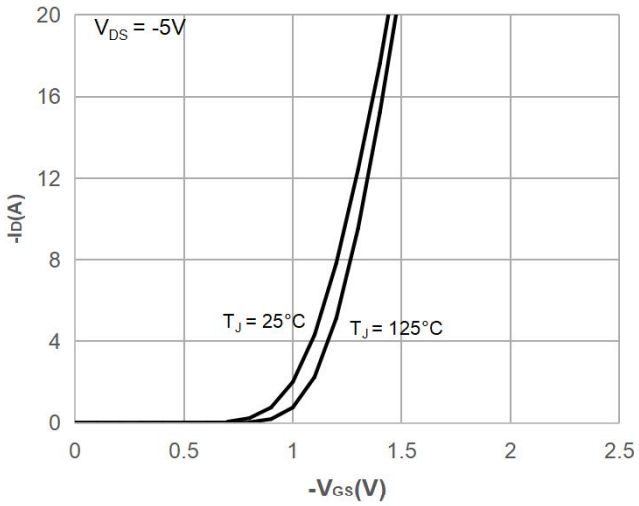


Figure 3: On-resistance vs. Drain Current

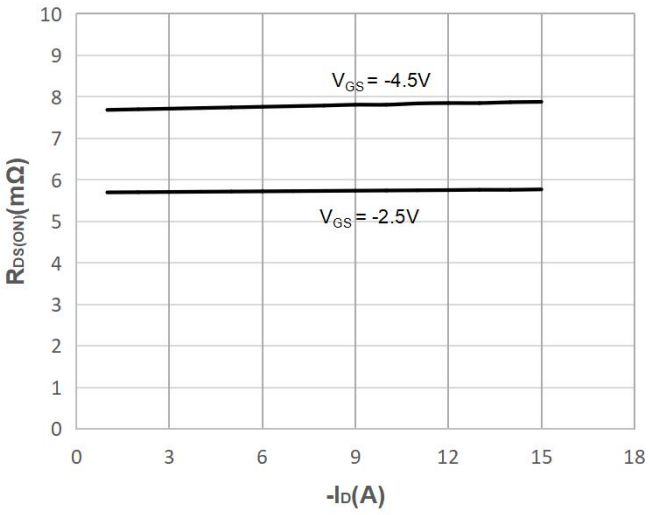


Figure 4: Body Diode Characteristics

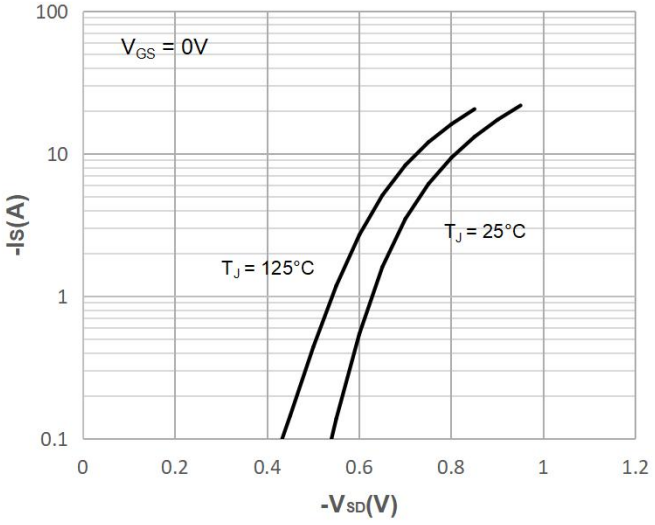


Figure 5: Gate Charge Characteristics

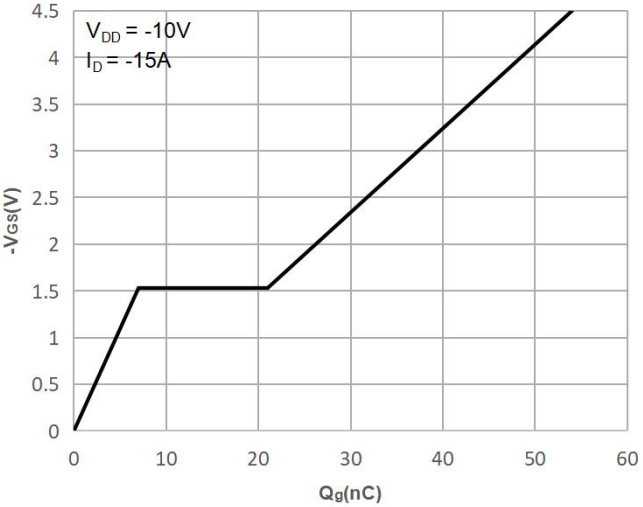


Figure 6: Capacitance Characteristics

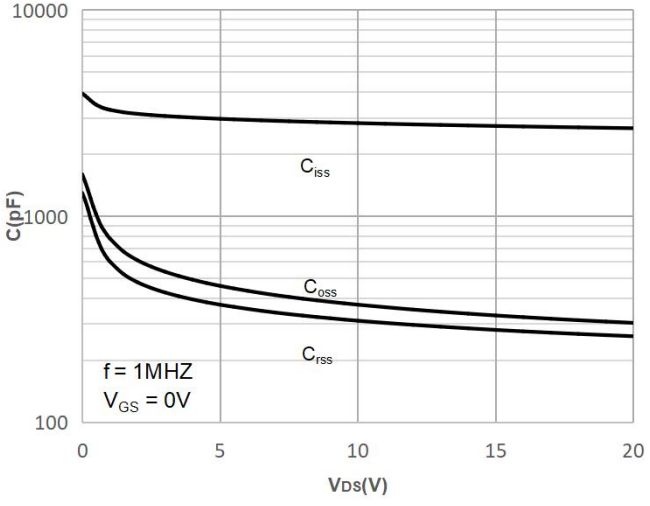


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

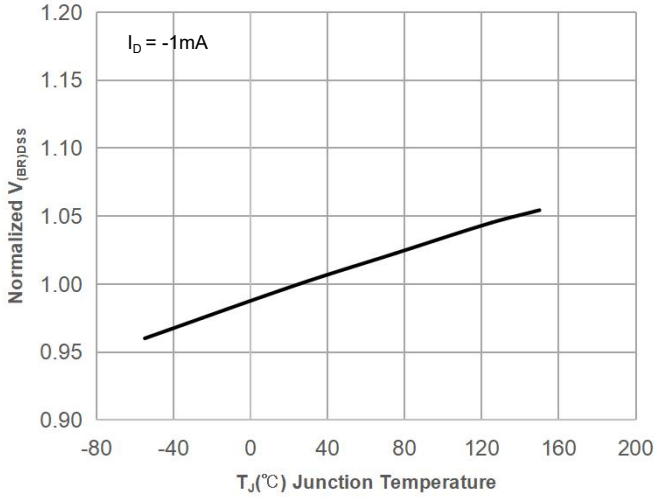


Figure 8: Normalized on Resistance vs. Junction Temperature

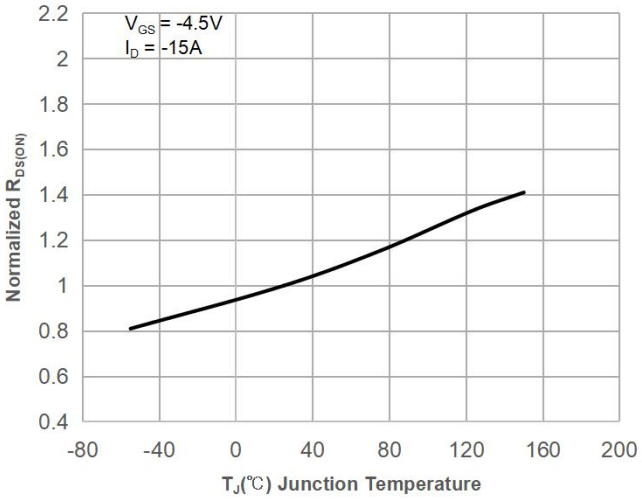


Figure 9: Maximum Safe Operating Area

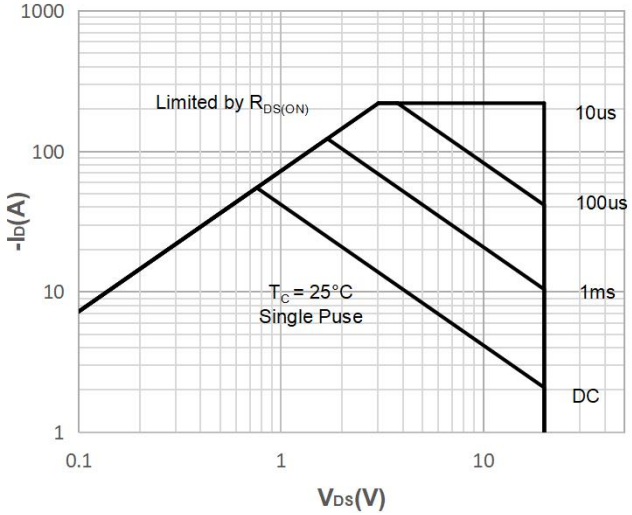


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

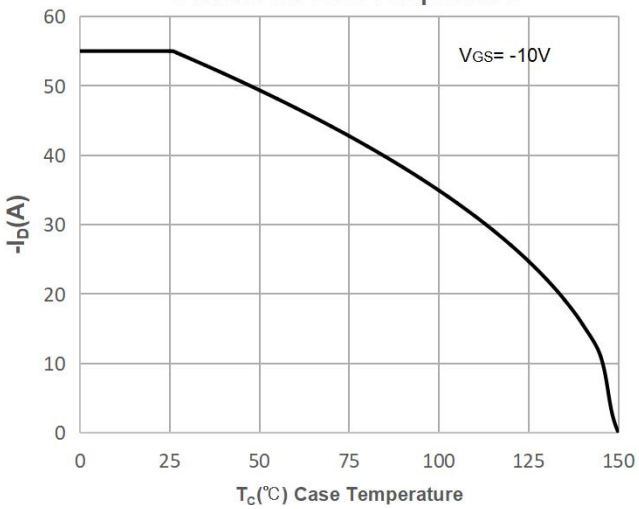


Figure 11: Normalized Maximum Transient Thermal Impedance

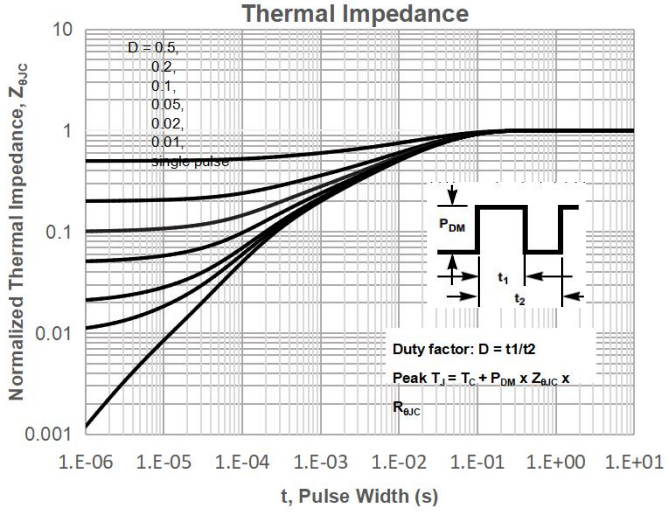
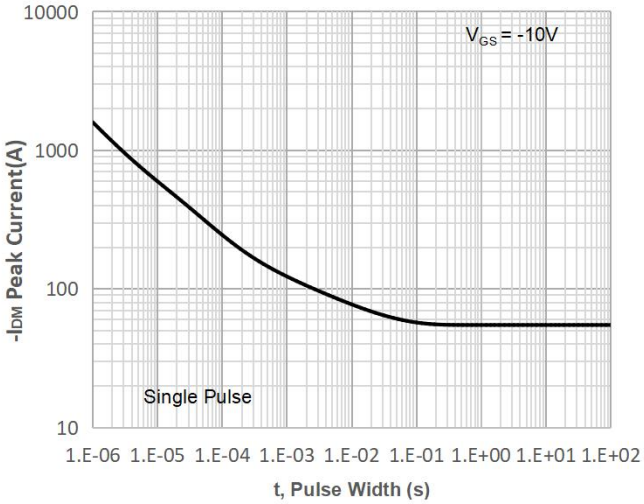
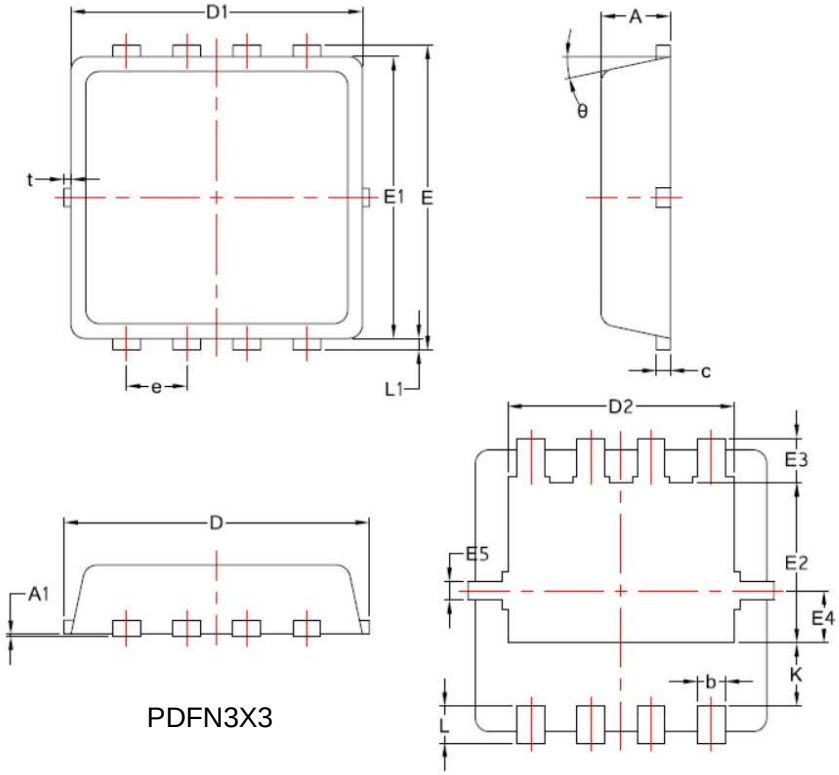


Figure 12: Peak Current Capacity



Package Mechanical Data



PDFN3X3

SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
θ	10°	12°	14°

Revision History

Revision	Release	Remark
V1.0	2024/03/16	Initial Release

Disclaimer

The information given in this document describes the independent performance of the product,but similar performance is not guaranteed under other working conditions,and cannot be guaranteed when installed with other products or equipment.To achieve the required performance of the product in actual scenarios,the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings,operating conditions,or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which
requires high reliability.Customers using or selling these products for use in medical,life-saving,or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements,the information described or contained herein may be changed without prior notice.