

V_{DSS}	-45V
$R_{DS(on)}$ (Max.)	155mΩ
I_D	-4.5A
P_D	15W

●Features

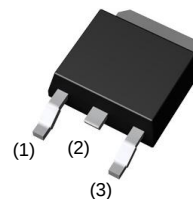
- 1) Low on-resistance.
- 2) Fast switching speed.
- 3) Drive circuits can be simple.
- 4) Parallel use is easy.
- 5) Pb-free lead plating ; RoHS compliant
- 6) 100% Avalanche tested

●Application

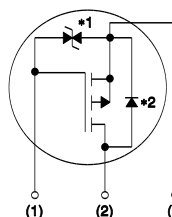
Switching Power Supply
Automotive Motor Drive
Automotive Solenoid Drive

●Outline

CPT3
(SC-63)
<SOT-428>



●Inner circuit



(1) Gate
(2) Drain
(3) Source

*1 ESD PROTECTION DIODE
*2 BODY DIODE

●Packaging specifications

Type	Packaging	Taping
	Reel size (mm)	330
	Tape width (mm)	16
	Basic ordering unit (pcs)	2,500
	Taping code	TL
	Marking	046P05

●Absolute maximum ratings($T_a = 25^\circ\text{C}$)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	-45	V
Continuous drain current	$T_c = 25^\circ\text{C}$	I_D^{*1}	±4.5	A
	$T_c = 100^\circ\text{C}$	I_D^{*1}	±2.4	A
Pulsed drain current		$I_{D,pulse}^{*2}$	±9.0	A
Gate - Source voltage		V_{GSS}	±20	V
Avalanche energy, single pulse		E_{AS}^{*3}	14.3	mJ
Avalanche current		I_{AR}^{*3}	-4.5	A
Power dissipation	$T_c = 25^\circ\text{C}$	P_D	15	W
	$T_a = 25^\circ\text{C}^{*4}$	P_D	0.85	W
Junction temperature		T_j	150	°C
Range of storage temperature		T_{stg}	-55 to +150	°C

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJC}	-	-	8.33	°C/W
Thermal resistance, junction - ambient ^{*4}	R_{thJA}	-	-	147	°C/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	°C

●Electrical characteristics($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -1mA$	-45	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -45V, V_{GS} = 0V$ $T_j = 25^\circ\text{C}$	-	-	-1	μA
		$V_{DS} = -45V, V_{GS} = 0V$ $T_j = 125^\circ\text{C}$	-	-	-100	
Gate - Source leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 10	μA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = -10V, I_D = -1mA$	-1	-	-3	V
Static drain - source on - state resistance	$R_{DS(on)}^{*5}$	$V_{GS} = -10V, I_D = -4.5A$	-	110	155	$\text{m}\Omega$
		$V_{GS} = -4.5V, I_D = -4.5A$	-	160	225	
		$V_{GS} = -4.0V, I_D = -4.5A$	-	185	260	
		$V_{GS} = -10V, I_D = -4.5A$ $T_j = 125^\circ\text{C}$	-	180	250	
Forward transfer admittance	g_{fs}	$V_{DS} = -10V, I_D = -4.5A$	3	6	-	S

●Electrical characteristics($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	$V_{GS} = 0V$	-	550	-	pF
Output capacitance	C_{oss}	$V_{DS} = -10V$	-	100	-	
Reverse transfer capacitance	C_{rss}	$f = 1\text{MHz}$	-	50	-	
Turn - on delay time	$t_{d(on)}^{*5}$	$V_{DD} \approx -25V, V_{GS} = -10V$	-	8	-	ns
Rise time	t_r^{*5}	$I_D = -2.0A$	-	8	-	
Turn - off delay time	$t_{d(off)}^{*5}$	$R_L = 12\Omega$	-	35	-	
Fall time	t_f^{*5}	$R_G = 10\Omega$	-	8	-	

●Gate Charge characteristics($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*5}	$V_{DD} \approx -25V$	-	12	-	nC
Gate - Source charge	Q_{gs}^{*5}	$I_D = -4.5A$	-	2.2	-	
Gate - Drain charge	Q_{gd}^{*5}	$V_{GS} = -5V$	-	2.2	-	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} \approx -30V, I_D = -4.5A$	-	-3.4	-	V

●Body diode electrical characteristics (Source-Drain)($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous source current	I_S^{*1}	$T_c = 25^\circ\text{C}$	-	6	-4.5	A
Pulsed source current	I_{SM}^{*2}		-	-	-9	A
Forward voltage	V_{SD}^{*5}	$V_{GS} = 0V, I_S = -4.5A$	-	-	-1.2	V
Reverse recovery time	t_{rr}^{*5}	$I_S = -4.5A$	-	40	-	ns
Reverse recovery charge	Q_{rr}^{*5}	$di/dt = -100A/\mu s$	-	60	-	μC

*1 Limited only by maximum temperature allowed.

*2 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$

*3 $L \approx 1mH$, $V_{DD} = -25V$, $R_g = 10\Omega$, starting $T_j = 25^\circ\text{C}$

*4 Mounted on a epoxy PCB FR4 (20mm $\times$ 30mm $\times$ 0.8mm)

*5 Pulsed

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

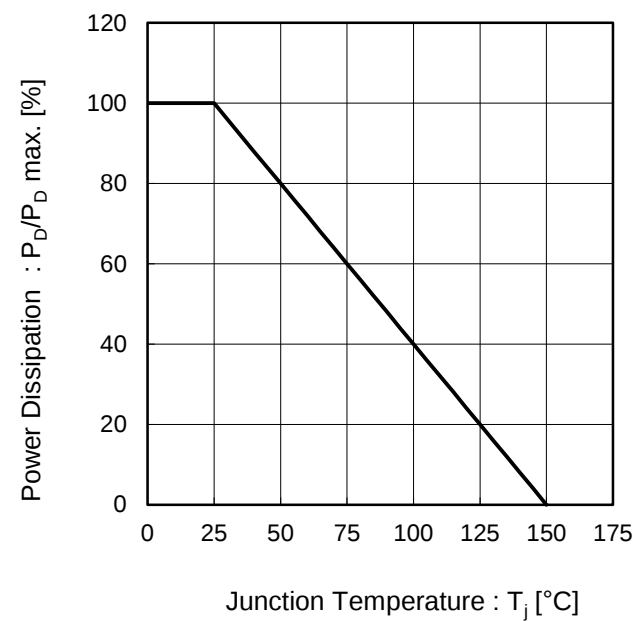


Fig.2 Maximum Safe Operating Area

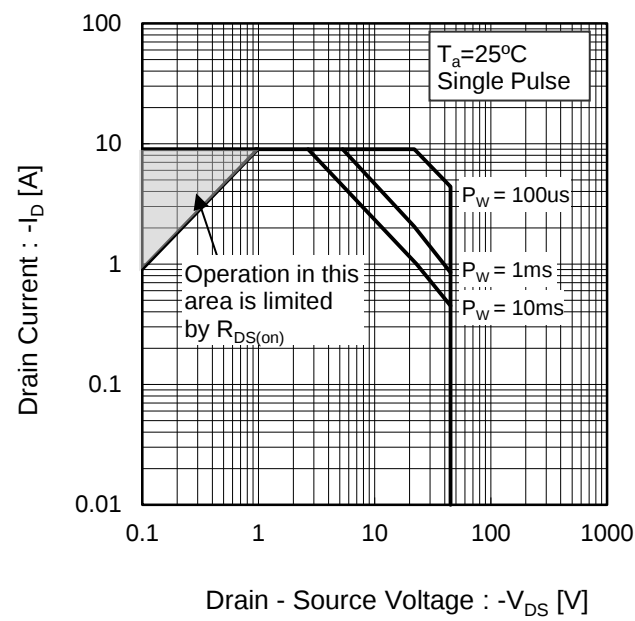
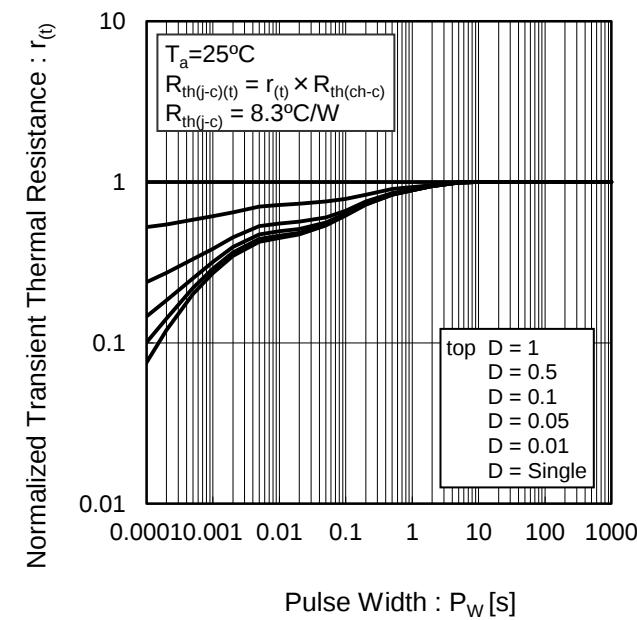


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Avalanche Current vs Inductive Load

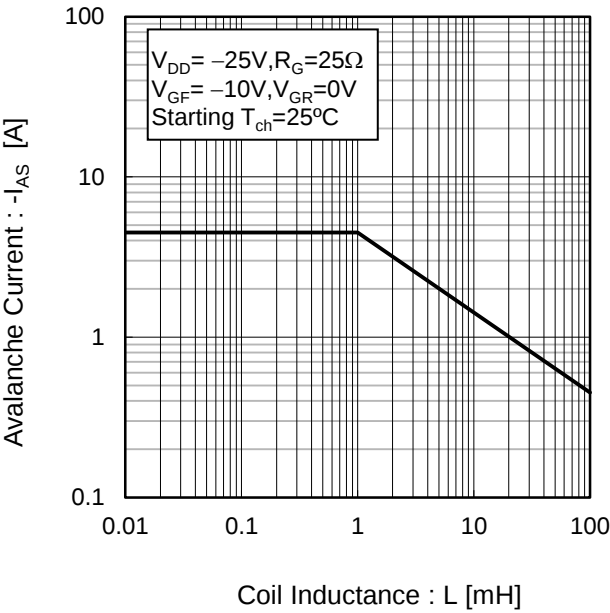


Fig.5 Avalanche Energy Derating Curve vs Junction Temperature

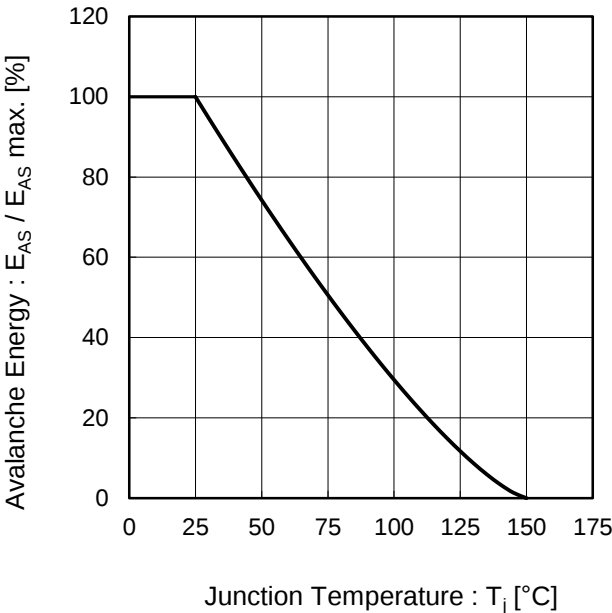


Fig.6 Typical Output Characteristics(I)

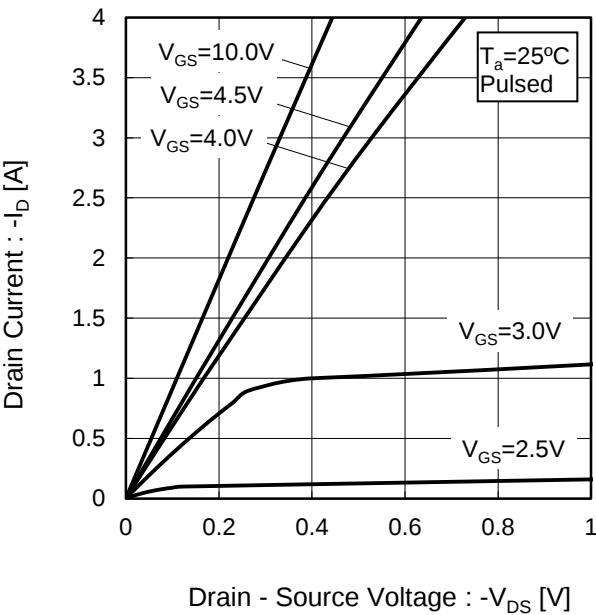
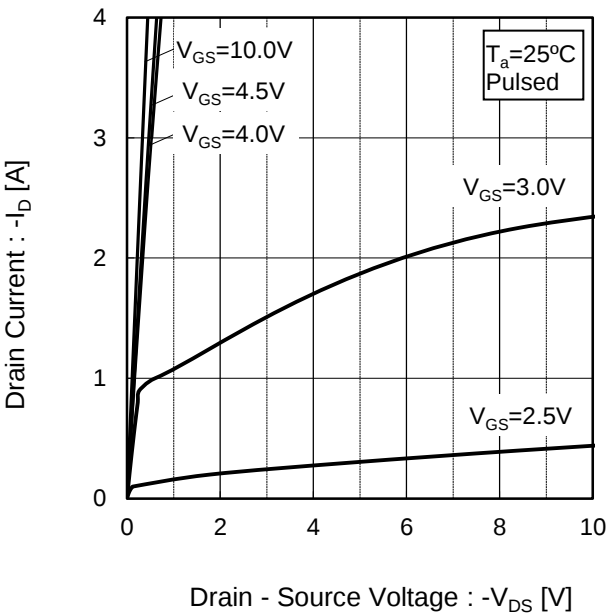


Fig.7 Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Breakdown Voltage
vs. Junction Temperature

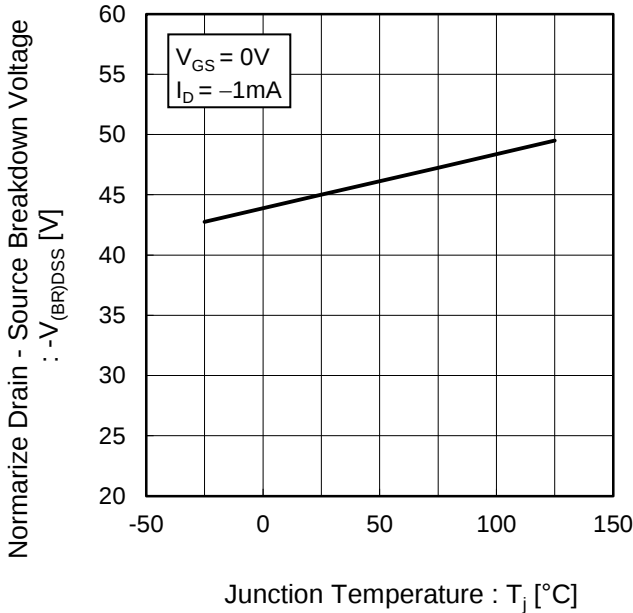


Fig.9 Typical Transfer Characteristics

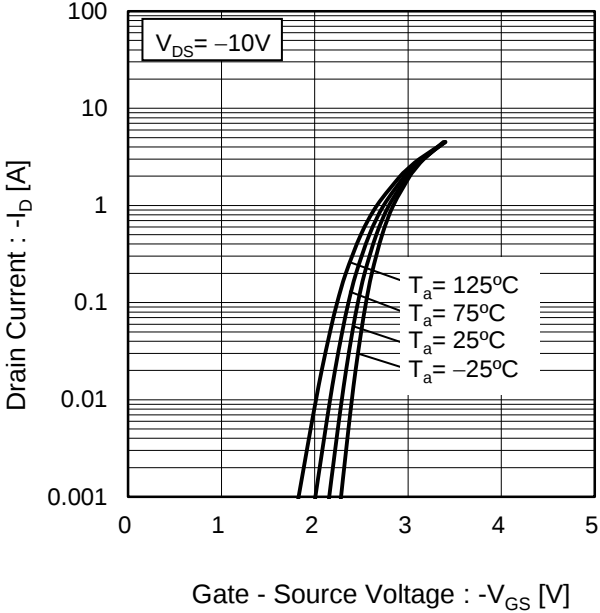


Fig.10 Gate Threshold Voltage
vs. Junction Temperature

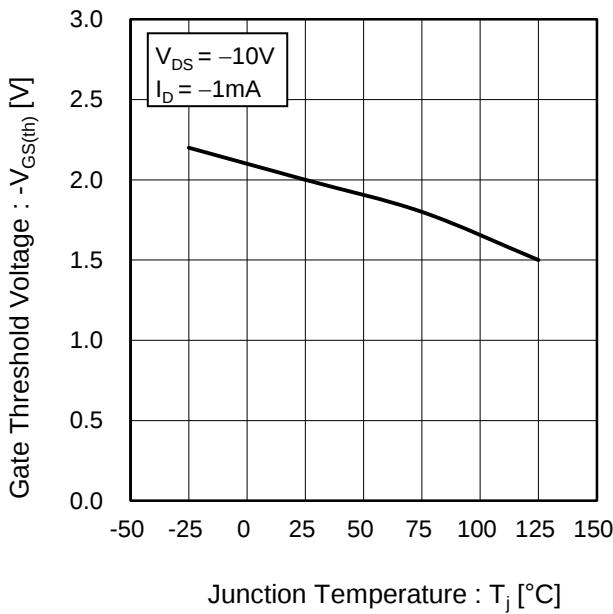
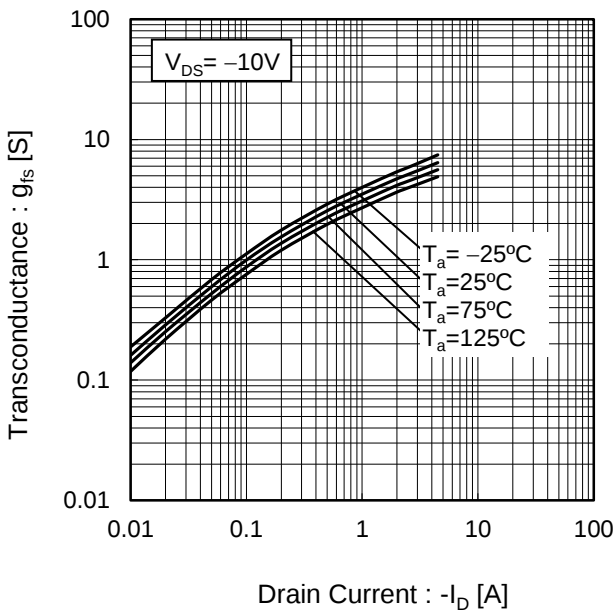


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

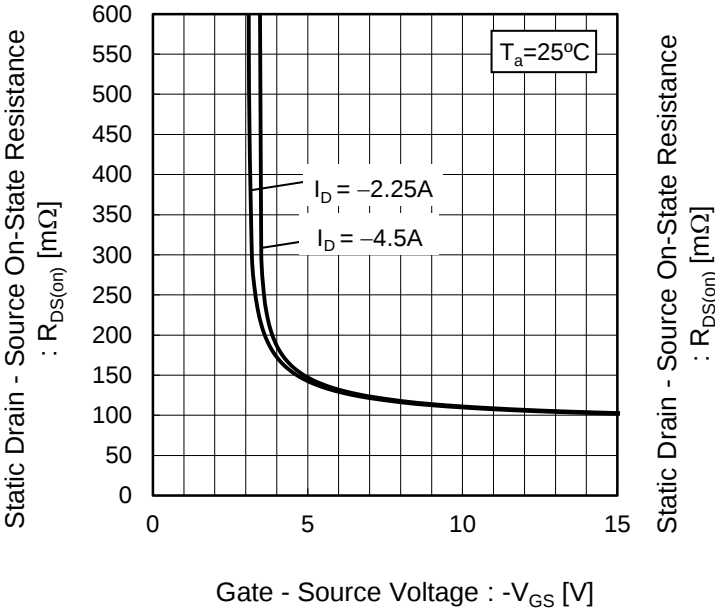


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(I)

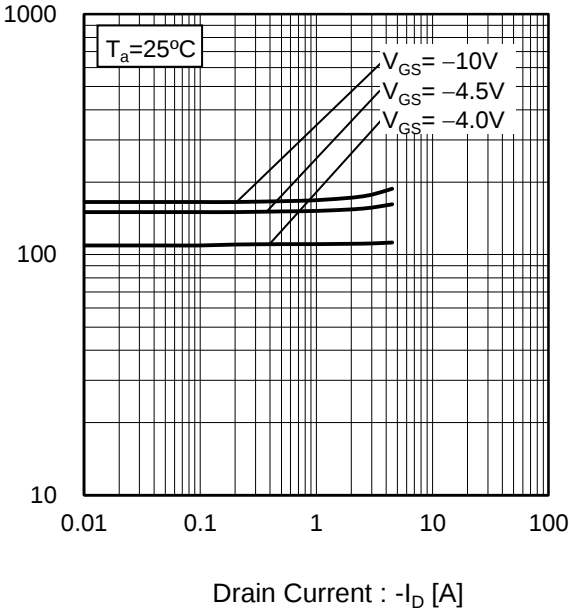
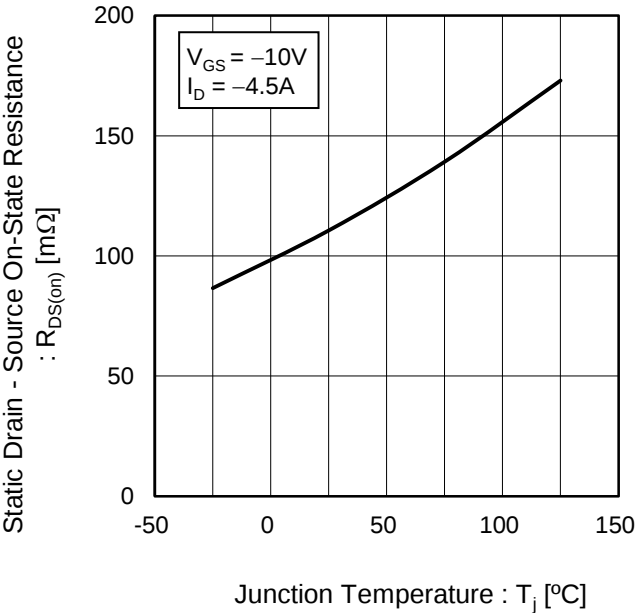


Fig.14 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

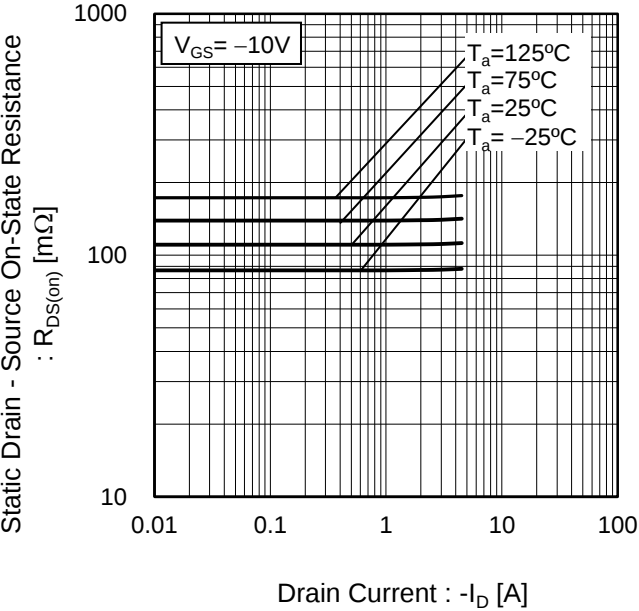


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)

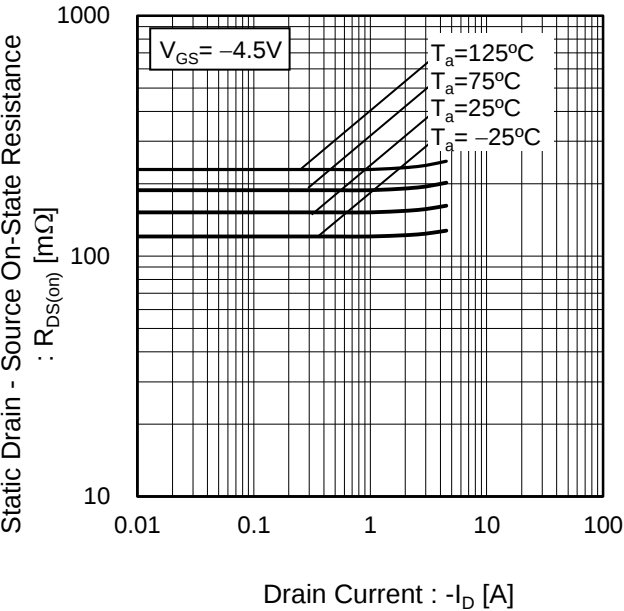


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current(IV)

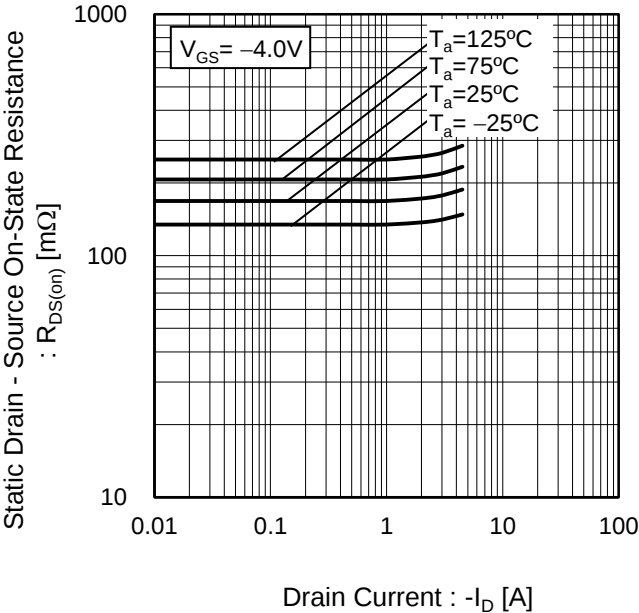
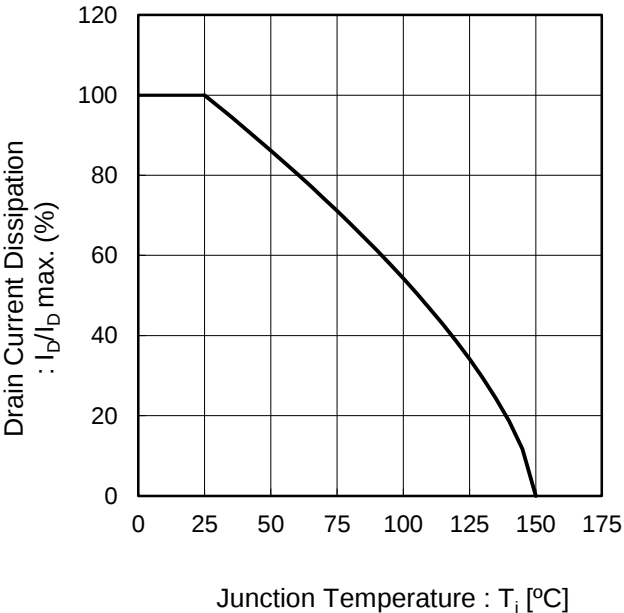


Fig.18 Drain Current Derating Curve



●Electrical characteristic curves

Fig.19 Typical Capacitance vs. Drain - Source Voltage

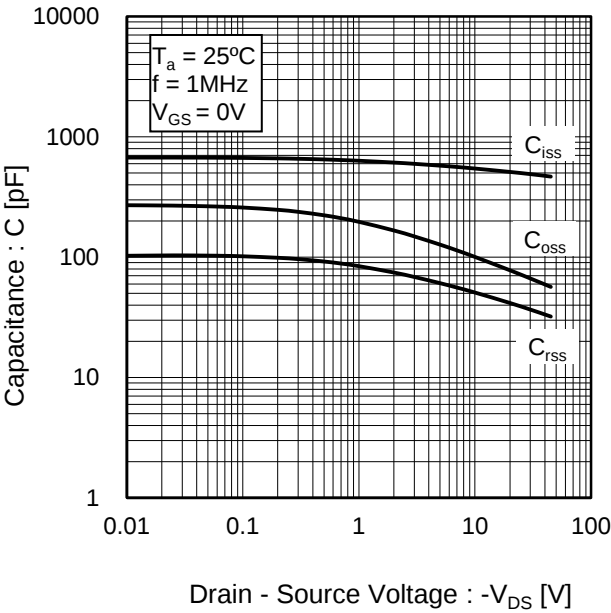


Fig.20 Switching Characteristics

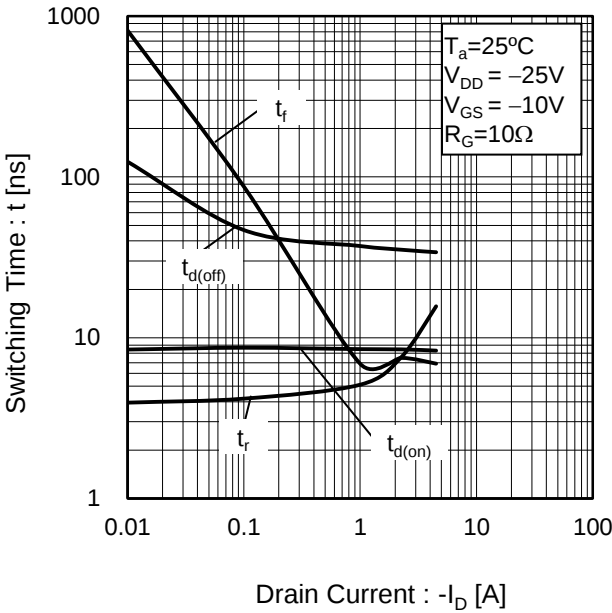


Fig.21 Dynamic Input Characteristics

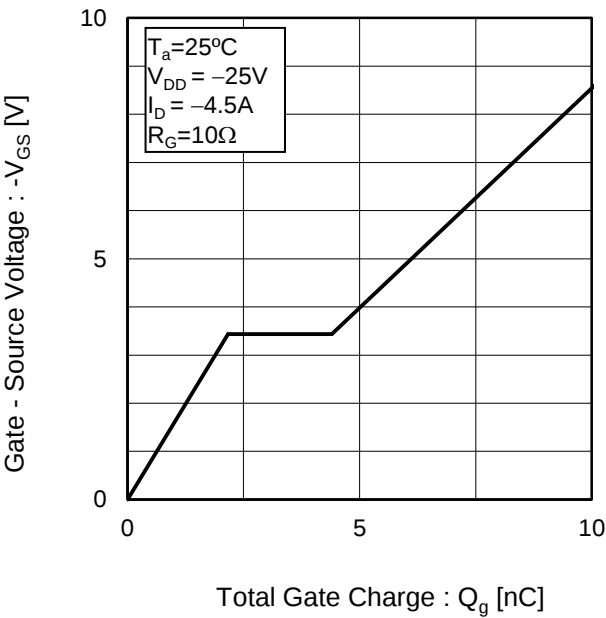
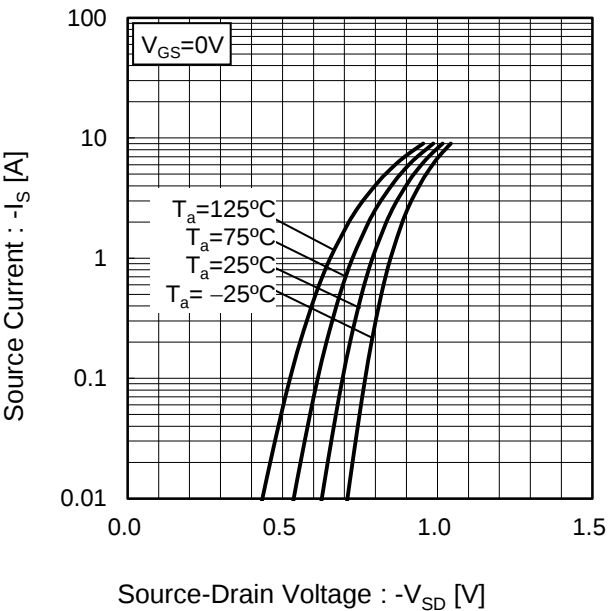
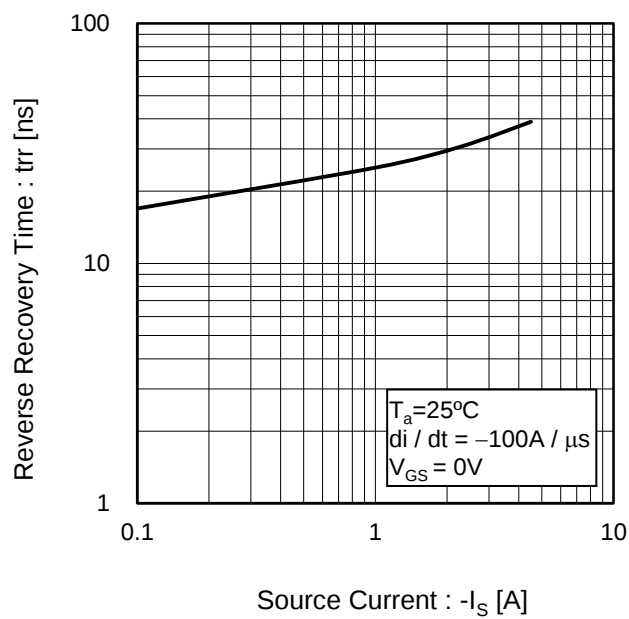


Fig.22 Source Current vs. Source - Drain Voltage



●Electrical characteristic curves

Fig23 Reverse Recovery Time
vs.Source Current

●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

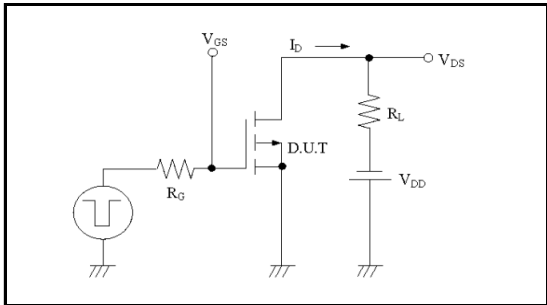


Fig.1-2 Switching Waveforms

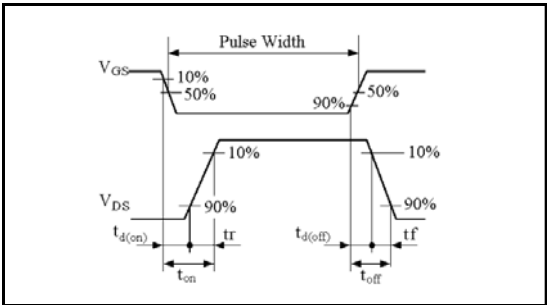


Fig.2-1 Gate Charge Measurement Circuit

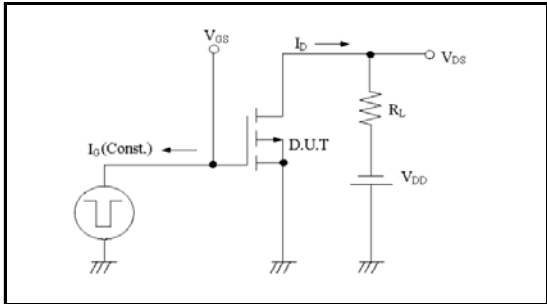


Fig.2-2 Gate Charge Waveform

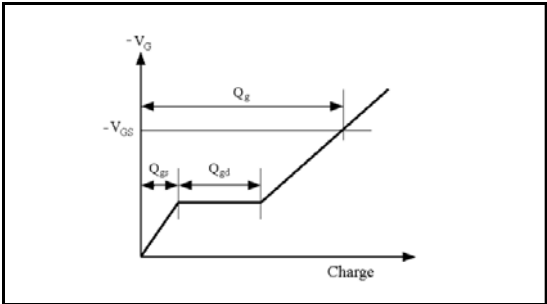


Fig.3-1 Avalanche Measurement Circuit

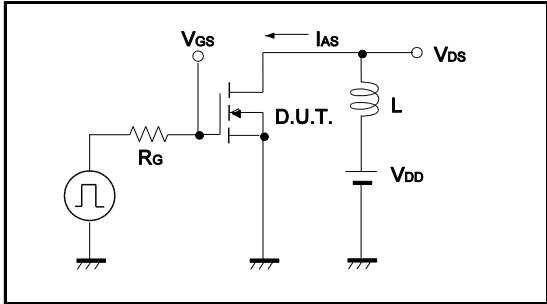
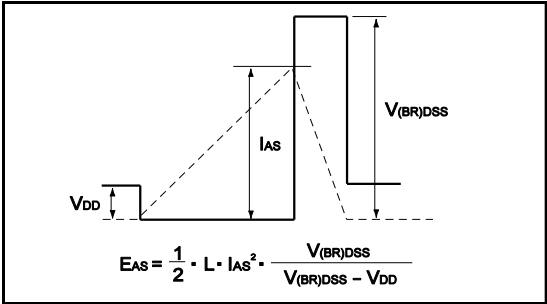
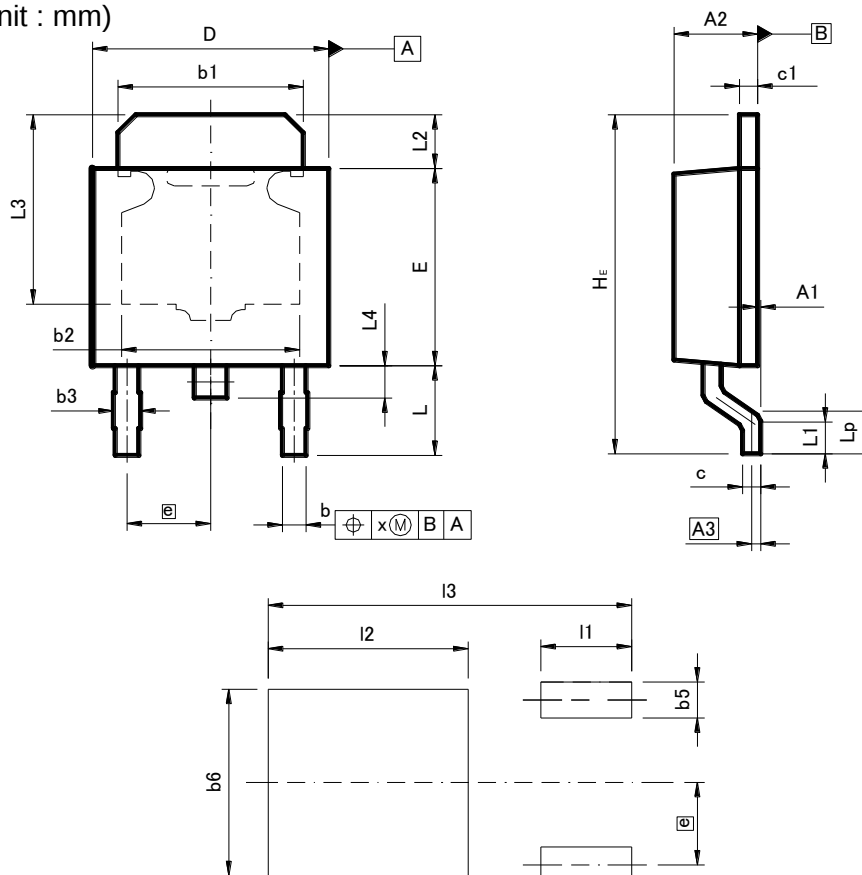


Fig.3-2 Avalanche Waveform



●Dimensions (Unit : mm)

CPT3



Pattern of terminal position areas
[Not a recommended pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A1	0.00	0.15	0.000	0.006
A2	2.20	2.50	0.087	0.098
A3	0.25		0.010	
b	0.55	0.75	0.022	0.030
b1	5.00	5.30	0.197	0.209
b2	5.00		0.197	
b3	0.75		0.030	
c	0.40	0.60	0.016	0.024
c1	0.40	0.60	0.016	0.024
D	6.30	6.70	0.248	0.264
E	5.40	5.80	0.213	0.228
e	2.30		0.091	
HE	9.00	10.00	0.354	0.394
L	2.20	2.80	0.087	0.110
L1	0.80	1.40	0.031	0.055
L2	1.20	1.80	0.047	0.071
L3	5.30		0.209	
L4	0.90		0.035	
Lp	1.00	1.60	0.039	0.063
x	—	0.25	—	0.010

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b5	—	1.00	—	0.04
b6	—	5.20	—	0.205
l1	—	2.50	—	0.098
l2	—	5.50	—	0.217
l3	—	10.00	—	0.394

Dimension in mm / inches

Notes

- 1) The information contained herein is subject to change without notice.
- 2) Before you use our Products, please contact our sales representative and verify the latest specifications :
- 3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Products beyond the rating specified by ROHM.
- 4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.
- 5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.
- 6) The Products are intended for use in general electronic equipment (i.e. AV/OA devices, communication, consumer systems, gaming/entertainment sets) as well as the applications indicated in this document.
- 7) The Products specified in this document are not designed to be radiation tolerant.
- 8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.
- 9) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.
- 10) ROHM shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.
- 11) ROHM has used reasonable care to ensure the accuracy of the information contained in this document. However, ROHM does not warrant that such information is error-free, and ROHM shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.
- 12) Please use the Products in accordance with any applicable environmental laws and regulations, such as the RoHS Directive. For more details, including RoHS compatibility, please contact a ROHM sales office. ROHM shall have no responsibility for any damages or losses resulting from non-compliance with any applicable laws or regulations.
- 13) When providing our Products and technologies contained in this document to other countries, you must abide by the procedures and provisions stipulated in all applicable export laws and regulations, including without limitation the US Export Administration Regulations and the Foreign Exchange and Foreign Trade Act.
- 14) This document, in part or in whole, may not be reprinted or reproduced without prior consent of ROHM.



Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact us.

ROHM Customer Support System

<http://www.rohm.com/contact/>