

# PRODUCT INFORMATION



## CD28 Long Isoform Extracellular Domain (human, recombinant)

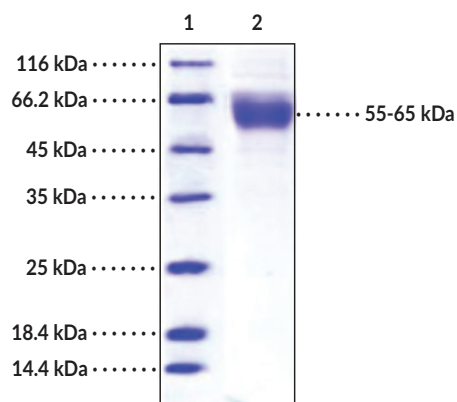
Item No. 32014

### Overview and Properties

**Synonyms:** T Cell-specific Surface Glycoprotein CD28, TP44  
**Source:** Recombinant C-terminal human IgG1 Fc-tagged CD28 expressed in HEK293 cells  
**Amino Acids:** 19-152  
**Molecular Weight:** 42 kDa  
**Storage:** -80°C (as supplied)  
**Stability:** ≥1 year  
**Purity:** ≥90% estimated by SDS-PAGE  
**Supplied in:** Lyophilized from sterile PBS, pH 7.4  
**Endotoxin Testing:** <1.0 EU/μg, determined by the LAL endotoxin assay

*Information represents the product specifications. Batch specific analytical results are provided on each certificate of analysis.*

### Image



Lane 1: MW Marker

Lane 2: CD28 Long Isoform Extracellular Domain

**SDS-PAGE Analysis of CD28 Long Isoform Extracellular Domain.** This protein has a calculated molecular weight of 42 kDa. It has an apparent molecular weight of approximately 55-65 kDa by SDS-PAGE under reducing conditions due to glycosylation.

WARNING  
THIS PRODUCT IS FOR RESEARCH ONLY - NOT FOR HUMAN OR VETERINARY DIAGNOSTIC OR THERAPEUTIC USE.

SAFETY DATA  
This material should be considered hazardous until further information becomes available. Do not ingest, inhale, get in eyes, on skin, or on clothing. Wash thoroughly after handling. Before use, the user must review the complete Safety Data Sheet, which has been sent via email to your institution.

WARRANTY AND LIMITATION OF REMEDY  
Buyer agrees to purchase the material subject to Cayman's Terms and Conditions. Complete Terms and Conditions including Warranty and Limitation of Liability information can be found on our website.

Copyright Cayman Chemical Company, 01/26/2022

CAYMAN CHEMICAL

1180 EAST ELLSWORTH RD

ANN ARBOR, MI 48108 · USA

PHONE: [800] 364-9897

[734] 971-3335

FAX: [734] 971-3640

CUSTSERV@CAYMANCHEM.COM

WWW.CAYMANCHEM.COM

# PRODUCT INFORMATION



## Description

---

CD28 is a glycoprotein and member of the CD28/B7 family of co-stimulatory receptors that promotes T cell activation.<sup>1</sup> Alternative splicing of CD28 produces one full-length long isoform, CD28 long, and three short isoforms, CD28a, CD28b, and CD28c.<sup>2</sup> CD28 long exists as a membrane-bound homodimer and contains a leader peptide, an extracellular immunoglobulin variable (IgV) domain that interacts with the co-stimulatory molecules CD80 (Item No. 32013) or CD86 and a cytoplasmic tail that mediates the association with the signal transduction enzyme PI3K and is critical for T cell activation.<sup>1,3</sup> CD28a, CD28b, and CD28c contain truncated extracellular or transmembrane domains and exist as soluble monomers (CD28a) or membrane-bound homodimers (CD28b and CD28c).<sup>2</sup> CD28 is constitutively expressed on the surface of T cells, upregulated by antigen-presenting cells (APCs) displaying MHC-bound antigen, and downregulated after T cell activation.<sup>4,5</sup> CD28 competes with CTLA-4 (Item No. 32009), an inhibitor of T cell activation also expressed on T cells, for binding to CD80 or CD86, promoting T cell activation by inducing the production of cytokines, such as IL-2 and IFN- $\gamma$ , and decreasing the T cell receptor activation threshold.<sup>4</sup> Genetic deletion of CD28 abolishes cellular infiltration and bone erosion in the joints and decreases serum levels of anti-collagen-IgG in a mouse model of collagen-induced arthritis.<sup>6</sup> CD28 levels are decreased on plasma cells isolated from patients with multiple myeloma and this decrease is associated with disease progression and poor prognosis.<sup>7</sup> CD28 SNPs have been found in individuals with sporadic breast cancer.<sup>8</sup> Cayman's CD28 Long Isoform Extracellular Domain (human, recombinant) protein is a disulfide-linked homodimer. The reduced monomer, comprised of CD28 (amino acids 19-152) fused to human IgG1 Fc at its C-terminus, consists of 375 amino acids, has a calculated molecular weight of 42 kDa, and a predicted N-terminus of Asn19 after signal peptide cleavage. As a result of glycosylation, the monomer migrates at approximately 55 to 65 kDa by SDS-PAGE under reducing conditions.

## References

---

1. Esensten, J.H., Helou, Y.A., Chopra, G., *et al.* CD28 costimulation: from mechanism to therapy. *Immunity* **44**(5), 973-988 (2016).
2. Magistrelli, G., Jeannin, P., Elson, G., *et al.* Identification of three alternatively spliced variants of human CD28 mRNA. *Biochem. Biophys. Res. Commun.* **259**(1), 34-37 (1999).
3. Stein, P.H., Fraser, J.D., and Weiss, A. The cytoplasmic domain of CD28 is both necessary and sufficient for costimulation of interleukin-2 secretion and association with phosphatidylinositol 3'-kinase. *Mol. Cell Biol.* **14**(5), 3392-3402 (1994).
4. Mak, T.W. and Saunders, M.E. T cell activation. *The Immune Response: Basic and Clinical Principles*, Piknett, T. and Lebedeva, V., Elsevier Academic Press 373-401 (2006).
5. Vallejo, A.N., Brandes, J.C., Weyand, C.M., *et al.* Modulation of CD28 expression: Distinct regulatory pathways during activation and replicative senescence. *J. Immunol.* **162**(11), 6572-6579 (1999).
6. Tada, Y., Nagasawa, K., Ho, A., *et al.* CD28-deficient mice are highly resistant to collagen-induced arthritis. *J. Immunol.* **162**(1), 203-208 (1999).
7. Nair, J.R., Calson, L.M., Koorella, C., *et al.* CD28 expressed on malignant plasma cells induces a pro-survival and immunosuppressive microenvironment. *J. Immunol.* **187**(3), 1243-1253 (2011).
8. Chen, S., Zhang, Q., Shen, L., *et al.* Investigation of CD28 gene polymorphisms in patients with sporadic breast cancer in a Chinese Han population in northeast China. *PLoS One* **7**(10), e48031 (2012).

CAYMAN CHEMICAL  
1180 EAST ELLSWORTH RD  
ANN ARBOR, MI 48108 · USA  
PHONE: [800] 364-9897  
[734] 971-3335  
FAX: [734] 971-3640  
CUSTSERV@CAYMANCHEM.COM  
WWW.CAYMANCHEM.COM